**Reader's Guide portfolio Jorn Kersten**

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# Version control

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# Introduction

This document serves as the readers guide for my semester 3 portfolio. The portfolio contains the developed products from this semester, using these products I will show proof I have gained enough knowledge to fulfil the requirements of the learning outcomes. In this guide you will find a short summary of each product per learning outcome. Thereafter there are a few links to the files where a longer worked out version of the product can be found.

# Learning outcomes

## 1.1 You design and build **user friendly**, **full-stack** web applications.

**Clarification:**

|  |  |
| --- | --- |
| **User friendly:** | You apply basic User experience testing and development techniques. |
| **Full-stack:** | You design and build a full stack application using commonly accepted front end (JavaScript-based framework) and back end techniques (e.g. Object Relational Mapping) choosing and implementing relevant communication protocols and addressing asynchronous communication issues. |

**Proof:**

In the following places I will show I have gained enough knowledge of the learning outcome:

“You design and build **user friendly**, **full-stack** web applications.”

[Software design](#_2.3_Software_design)

[UX design](#_2.4_UX_design)

[ORM](#_2.5_ORM)

[UX design (group project)](#_3.4_UX_design)

## 1.2 You use software **tooling and methodology** that continuously monitors and improve the software quality during software development.

**Clarification:**

|  |  |
| --- | --- |
| **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. |

**Proof:**

In the following places I will show I have gained enough knowledge of the learning outcome:

“You use software **tooling and methodology** that continuously monitors and improve the software quality during software development.”

[Security](#_2.2.4_Security_(wip))

[Quality assurance](#_2.5_Quality_assurance)

[My contribution](#_3.5_My_contribution)

## 1.3 You **choose** and implement the most suitable agile software development method for your software project.

**Clarification:**

|  |  |
| --- | --- |
| **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. |

**Proof:**

In the following places I will show I have gained enough knowledge of the learning outcome:

“You **choose** and implement the most suitable agile software development method for your software project.”

[Agile](#_2.2.1_Agile)

[Group project](#_Group_project)

## 1.4 You **design and implement** a (semi)automated software release process that matches the needs of the project context.

**Clarification:**

|  |  |
| --- | --- |
| **Design and implement:** | You design a release process and implement a continuous integration and deployment solution (using e.g. Gitlab CI and Docker). |

**Proof:**

In the following places I will show I have gained enough knowledge of the learning outcome:

“You **design and implement** a (semi)automated software release process that matches the needs of the project context.”

[CI/CD](#_2.6_CI/CD_(wip))

## 1.5 You **recognize** and **take into account** cultural differences between project stakeholders and ethical aspects in software development.

**Clarification:**

|  |  |
| --- | --- |
| **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. |

**Proof:**

In the following places I will show I have gained enough knowledge of the learning outcome:

“You **recognize** and **take into account** cultural differences between project stakeholders and ethical aspects in software development.”

[Cultural differences and ethics](#_2.2.6_Cultural_differences)

## 1.6 You analyse (non-functional) requirements, elaborate (architectural) designs and validate them using **multiple types of test techniques**.

**Clarification:**

|  |  |
| --- | --- |
| **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. |

**Proof:**

In the following places I will show I have gained enough knowledge of the learning outcome:

“You analyse (non-functional) requirements, elaborate (architectural) designs and validate them using **multiple types of test techniques**.”

[Frameworks](#_2.2.2_Frameworks)

[Database](#_2.2.3_Database)

[Software design](#_2.3_Software_design)

[Software design (Group project)](#_3.3_Software_design)

## 1.7 You analyse and describe **simple** business processes that are **related** to your project.

**Clarification:**

|  |  |
| --- | --- |
| **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). |

**Proof:**

In the following places I will show I have gained enough knowledge of the learning outcome:

“You analyse and describe **simple** business processes that are **related** to your project.”

[Business process](#_2.2.5_business_process)

## 1.8 You act in a **professional manner** during software development and learning.

**Clarification:**

|  |  |
| --- | --- |
| **Professional manner:** | 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. |

**Proof:**

In the following places I will show I have gained enough knowledge of the learning outcome:

“You act in a **professional manner** during software development and learning.”

[Security](#_2.2.4_Security_(wip))

[Software design (Group Project)](#_3.3_Software_design)

# Individual project

## 2.1 Description

My individual project that I have created is a website on which prices of equal products from multiple different supermarkets are compared. A user is able to conveniently see the price of an product and clearly sees if the prices is the cheapest from all supermarkets. They’ll also be able to see where the price at a specific supermarket has risen, stayed the same or decreased in comparison to the week before.

If the user wants to, they can login to the website and create a personal list of items they would like to see. They then to can filter by supermarkets within their own list. Outside of just comparing a list, they can also create a shopping list here the cheapest overall suggestion to order the selected products is shown to the user.

I have used the SCRUM framework for keeping track of my tasks, and I’m using git as a tool to keep a SCRUM board in which I can easily keep track of progress and a sprint planning. I have a total of 5 sprints of 3 weeks each. [My SCRUM board](https://github.com/users/Jorn-Kersten/projects/2/views/4).

## 2.2 Researches

### 2.2.1 Agile

Programming is often combined with good planning tools and methods. This semester I used Agile and scrum, which I used in both my individual and group project. Before I started working on my application, I used user stories to draw up my functional and non-functional requirements. For each sprint, I chose a few that I wanted to finish that sprint. I kept track of this in a scrum board on Github.

I researched Agile to learn more about it. With this, I want to demonstrate learning outcome 3 Agile method.

[Research Agile](Research%20documents/Agile%20research%20.docx)

### 2.2.2 Frameworks

Before creating the front-end, I researched a few frameworks and scoured the internet to see which framework would work best for me. I then weighed every advantage and disadvantage and made a choice based on what I thought would best suit my application.

The front-end framework I chose is Angular, I chose this framework instead of Vue.js or react. I chose Angular because it was completely new to me, this framework was most similar to C# which I was already comfortable with. I was eager to learn something new. Since I already have knowledge of React, that was going to be very difficult, which is why I didn't go for React. Beyond that, both React and Vue.js have the entire stack of a page in one file. Therefore, programming in React and Vue.js does not allow me to follow SOLID principles, which I would like to do.

For the back-end, I researched which programming language is best for creating an API. Here, I mainly looked at security of the programming language. I also considered the way the language works.

The two programming languages I compare are C# and Java. I briefly told you about both languages and then wrote down their features. Then I put the differences of both languages together, from this I made the choice to use Java.

This because I wanted to learn something new and because there was also a brief explanation from school about a framework using Java, which I wanted to learn and use.

[Software characterisation research](Research%20documents/software%20characterisation%20research.docx) page 4 and 8

### 2.2.3 Database

**SQL-based vs NoSQL-based**

When researching the what database I’d like to use, I found out there are two different ways of saving data in a database. An SQL-based database and an NoSQL-based database. Both have their advantages and disadvantages but based on the research I did on both of them, I found a NoSQL-based database wouldn’t be an option in my implementation.

[Software characterisation research](Research%20documents/software%20characterisation%20research.docx) page 11

**What database did I choose**

After finding out what type of database I should use in my project, I searched for what database options I had with using an SQL-based database. I compared MySQL, PostgreSQL, and MariaDB. The reason for it was that I had experience with MySQL and PostgreSQL and MariaDB both are kind of similar to MySQL.

After the research I had done I choose to go with MariaDB, as MariaDB doesn’t add many more features but it is faster in processing SQL query’s. The reason I didn’t choose PostgreSQL is that it adds a few more features like the possibility to add arrays as a column definition, which I didn’t need within my project.

[Software characterisation research](Research%20documents/software%20characterisation%20research.docx) page 13

### 2.2.4 Security

When you develop and publish a website, you expose it to a malicious environment. There are often people who try to break the website, or extract sensitive data from it from users. So while developing the website, it is very important that the application has as few security problems as possible. The brief for this study was to properly investigate exactly which security problem fits your project. Of course, they all belong, but I specifically chose to investigate Identification and Authentication Failures.

[Security OWASP research](Research%20documents/Security%20OWASP%20research.docx)

[DOT framework research](Research%20documents/DOT%20framework%20research.docx) page 5

### 2.2.5 business process

In this chapter, I researched business processes and how they can be applied to software engineering. I also made one about a section in the group project.

[Business process research](Research%20documents/Business%20process%20research.docx)

### 2.2.6 Cultural differences and ethics

In this chapter, I have explored what cultural differences and ethics are. I examined this in general but also what they are in software engineering. I have also shared my experiences.

[Cultural differences and ethics research](Research%20documents/Cultural%20differences%20and%20ethics%20research.docx)

### 2.2.7 software tests

Since it is very important to know which test to use in my projects, I did a research on tests. I now know better what tests there are, how to use them and when to use them. I managed to apply some of these tests in my project, if you want to know how I applied them look at [Quality assurance](#_2.5_Quality_assurance).

[Software tests research](Research%20documents/Software%20tests%20research.docx)

## 2.3 Software design

I created user stories based on the established requirements. I divided these into functional and non-functional user stories.

Based on these user stories, I first created a conceptual model to get a clearer picture of which components I am going to have in my website. After creating the conceptual model, I created a software architecture that shows how components communicate with each other.

[Software design](Software%20documents/Software%20design.docx)

## 2.4 UX design

There are all kinds of ways to arrive at a good website design. Different design methodologies, also called UX design, have been developed for this purpose. For this, I used a method that follows five steps. Starting with identifying the target audience, to make the right product you need to know for whom you are making it.

**Afbeelding met tafel

Automatisch gegenereerde beschrijving** In the image above, you can see the wireframes I created, these were created with Figma.

Since these sketches are not a whole, I worked it into wireframes to get an idea of the navigation structure and formatting of the data. I then worked this into a visual prototype, all the pages are linked together here so they can be clicked through.

Clicking through is done with testing. I asked three users if they could navigate to certain pages. If all three users could do this without help, it means the design is effective and I can start implementing it.

[UX design](Software%20documents/UX%20desgin.docx)

## 2.5 ORM

Object Relational Mapping also known as ORM, can be seen as a layer between object-oriented programming (OOP) and a relational database. When interacting with a database using OOP languages, you'll have to perform different operations like creating, reading, updating, and deleting (CRUD) data from a database. By design, you use SQL for performing these operations in relational databases.

While using SQL for this purpose isn't necessarily a bad idea, the ORM and ORM tools help simplify the interaction between relational databases and different OOP languages.

ORM tools can actually be written with any programming language. So this is a very simple way to combine OOP with a relational database. There is also a tool for this for Quarkus; our teacher Hans gave a simple workshop for this. I used the hibernate function, this is a function of the Quarkus library called Panache.



In the image above, a class is called that uses Panache to create a PanacheRepository based on the Product class. This class defines all the desired proportions that can be found in the table Product. Afbeelding met tekst

Automatisch gegenereerde beschrijving

## 2.5 Quality assurance

Before I could start creating tests, I wanted to know what kind of tests are out there. I examined these tests briefly and put them in a file so I knew what kind of tests I could add. I chose some tests for this and also implemented them in my front- and back-end, I briefly told what and how I did it in the same file.

To see if the written software also works I wrote some integration tests, I did that for both my front- and back-end application. For the front-end, I tested the components by seeing when the Angular application is launched, whether they exist as I expect them to. Testing the back-end I did with mock data, the mock data is put on a temporary h2 database. Then I will compare the mock data to see if I get the right data back. I also test the endpoints to see if I get the right codes back from the endpoints (200, 201, 404, 401, etc.).

[Quality assurance](Quality%20assurance.docx)

## 2.6 CI/CD

### 2.6.1 CI

To ensure that the code continues to be tested after each change, I used CI aka Continuous Integration. CI is a file in your project that runs a set of created tests with each modification, often this goes along with GitHub actions. GitHub actions is a free programme that reads the CI file and follows and executes the steps in it.

Every time I push a customisation from the development branch to GitHub, GitHub actions automatically executes the CI file. The application is then built and tested immediately. If an error occurs, the code from the development branch is not merged with the main branch.

As this process is automatic, I then no longer have to test myself after each modification made to ensure that everything continues to work together. I added the CI process for both the front- and back-end.

Afbeelding met tekst, schermafbeelding, monitor, scherm

Automatisch gegenereerde beschrijving

[Front-end CI file](https://github.com/Jorn-Kersten/DB-03-Frontend/blob/main/.github/workflows/CI.yml)

[Back-end CI file](https://github.com/Jorn-Kersten/DB-03-Backend/blob/main/.github/workflows/CI.yml)

### 2.6.2 CD

After the code has gone through the CI flow and completed successfully, the CD flow is run this is again done using GitHub actions. Here the application is rebuilt to see if it still works, then it is hosted via Google Firebase. To push it, I used an npm package. After everything is tested to see if it works, the application are pushed to Firebase. Then after it is hosted I test the online application with Lighthouse, Lighhouse tests the loading speed of the application. After everything has been tested, Lighthouse creates a report on how fast everything loads and where there are areas for improvement. I integrated CD only for my front-end.

Afbeelding met tekst, schermafbeelding, monitor, scherm

Automatisch gegenereerde beschrijving

[Front-end CD file](https://github.com/Jorn-Kersten/DB-03-Frontend/blob/main/.github/workflows/CD.yml)

You can find the website here: <https://ajcompare-3c64a.web.app/>

# Group project

## 3.1 Description

### 3.1.1 About World of content

World of Content is driven by innovation. When we started, we 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 us closer to the dot on the horizon; automated global delivery of the perfect content tailored to the individual.

**Source:** <https://worldofcontent.com/nl-nl/about-us/>

### 3.1.2 Assignment

At the beginning of the semester, World of content gave us an assignment. This assignment is to create a dynamic scraper.

The product they we for World of content need to improve their current product. Their current product makes it very easy for a brand to put products for sale on retailers' websites. Different retailers need different types of data about the same product from a brand. World of content has a platform that puts this in a clear overview. A brand then only has to fill in the data requested in that overview instead of having to ask and check separately for each retailer.

After all the data is filled in, our assignment comes in handy. For some retailers, it can take a while for adjustments entered by brands on the World of content website to be implemented. A brand can always go and manually check whether their product on a retailer's website matches the indicated data on the World of content website. This takes a very long time and should happen very often if the brand sells a lot of products.

The solution to this: creating a scraper. Data from retailers' websites should be automatically retrieved and compared with a brand's indicated data. When the indicated data is found on the retailer's website, this data should be displayed in a clear overview.

For example, if the title is found on the retailer's website, the overview will show behind the title that it was found. The stated data of the brand and the found text on the retailer's page are displayed side by side so that this can be checked again by the brand.

If something similar is found, it should be shown in that same overview. It will then say that something was found, but it does not match the indicated data on the World of content website. If nothing at all is found, this is also indicated in the overview.

## 3.2 Workflow

Throughout the project, we worked with the project group in an agile manner. We used the scrum method during this project. For this we used GitHub as a tool. in GitHub, every sprint we keep track of what tasks we have, how far we are with these and what still needs to be done. We had already worked with this a bit, and we wanted to work with this in our individual project as well. In addition, this also helps with demonstrating the learning outcomes.

[View our Scrum board on GitHub](https://github.com/orgs/WJJCN/projects/1)

The task can be split into two directions. Creating the scraper and creating the website that displays the results. I worked with Nick to create the scraper. We started by writing crawler that retrieves all URLs on a website that are related to products on that website. We list these URLs and then compare them with the products in the database.

If a URL matches a product from the database, we retrieve the URL. From the data we get back, we extract certain elements of the page. This is always just text, we then compare this text with the data of the product that matched the URL. Before we started, we researched in which programming language a scraper could be most easily and best written. From this came Python, we then chose to write everything with Python 3.10.

## 3.3 Software design

Just after we got the assignment from World of content, we converted the requirements into user stories with the group. Then, to make it clearer for ourselves, we made a concept diagram. We based an ERD on this so that we could easily set up a database with it. Because not all data always have the same properties, we opted for a NoSQL database.

These diagrams/models and related information can be found in the software design document in the Group project directory.

[View software design group project](Software%20documents/Software%20design%20(group).docx)

## 3.4 UX design

At the beginning of the project, we spent a lot of time with the whole group to create the design of the website. I didn't create a design myself, but I gave a lot of feedback to people who did. Whenever we disagreed with the group about something in the design, we discussed it together. If we disagreed, we immediately made two options. If we were not sure what to do we asked the stakeholder what he wanted with that piece of the design.

The link below shows the final design.

[View design file](https://www.figma.com/file/QXiSsczGjRt8JTmbToN7Wz/World-Of-Content-Live-Score)



## 3.5 My contribution

Nick and I took on the task of making the scraper together. Together, we had to ensure that data is automatically and dynamically retrieved and then compared.

To get this done, we split the task: "Create a scraper that automatically and dynamically retrieves and compares data" into a three sub-tasks.

We then looked at which programming language we could best use to create the scraper. We did a little research on this. Most websites pointed to Python, with one library specifically: Beautifullsoup 4. We then chose to use the same Python version throughout the project. We are using an AWS server, on which we have lambda functions. Of these lambda functions, we cannot choose which Python version we use, here the Python version is 3.10. So this is also the version we used for our scraper.

The first task is to ensure that we retrieve the necessary links from a merchant's website. These are all links that belong to products, there are sometimes cookbooks or other unnecessary links on a retailer's website.

In the second task, we want to compare the URLs found with the products in the database. If after the beginning of the URL, i.e. from the first "/", the name of the product is found in the URL then that is probably the URL of the product.

Then comes the final task, retrieving and actually comparing data. The HTML source code is retrieved and then put into a Beautifullsoup object. This allows easy retrieval of elements from the HTML page, these are all p-tags, span-tags, h1-tags, h2-tags and li-tags. All text between these tags is then compared one by one and then stored in a list. When all tags are compared, the length of the found text is compared to the correct text from the database. Then everything is stored in the database so it can be displayed to the brands.

# Reflection

## 4.1 What I’m proud of

This semester, I am very proud of what I was able to create with the group project. I had made a simple scraper before, but never anything similar to what I have made now. Since this project has to work at as many retailers as possible, making the scraper was another step harder. This made me even more careful not to use fixed objects from a particular website. Otherwise, it would only work with one website, which is not the intention of the assignment.

I further ran into a lot of problems while making the scraper that were quite complicated. Nick and I often discussed these together and then chose a solution, first discussing the pros and cons of the solutions we could come up with.

I am very happy that we have created an almost fully web-enabled scraper that can find the right product pages from almost any website we enter and extract the right data from them.

I also learned to work with Python, which I had never worked with before either.

## 4.2 What went wrong

A lot of things have also not gone well this semester. The biggest thing that has gone wrong is actually my planning. I started really working on my individual project far too late, for several reasons. In the beginning, I didn't really know what I wanted to make as my individual project, once I came up with these I didn't really know where to put my focus. I didn't really have a clear line whether I should focus more on programming or not.

In addition, I had to work from home a lot, unfortunately I can't really keep my attention and focus properly on my work at home. Because of this, I mostly didn't do much in the beginning, later after in the project I realised I was way behind and still did a lot.

Lastly, I didn't keep up with my Git very well either, this is something I want to do a lot better next semester. When making the project, I kept forgetting to push to git, because I am working on the project just by myself. I then don't get the feeling that I need to push to git. Because of this, if my laptop breaks down I might not be able to access my project.

Besides, this also meant I couldn't keep up with my test, which could be very bad for the project.

## 4.3 Reflection 12-01-2023

1. **Web application**

Proficient: I understand well how to make a clear web application for users of multiple ages. In addition, adding a feature has become very easy. Therefore, I think I have mastered this learning objective well enough to be at proficient.

In creating the web application, I learned how to create a good and secure API and also send clear messages back to the front-end for the user. The challenging part here was learning Java, which I had no knowledge of at the beginning of the semester. Applying the right messages when something succeeded or failed was also quite difficult in the beginning, this became a lot easier later after.

1. **Software Quality**

Proficient: I know well what tests are and what they are for. I have managed to apply many of them within my project. I have therefore felt that I am at a proficient level because of this.

In semester 2, I learned what unit tests and integration tests are, as well as when to apply them. In this semester I learned that there are many other tests for many other purposes. It is very helpful to know this so I can more easily apply tests for the right components in future projects.

1. **Agile method**

Proficient: I made worse use of agile in the individual project, but I still used it. In at the end of the semester, I also managed to pick this up better. But especially in the group project, we used agile a lot. Every morning of the group project, we did a stand-up of what each group member was going to do. in addition, every sprint we did a retrospective where we tried to participate as much as possible.

I already knew a little bit about Agile, I did use this before. I learned this semester how to apply all the elements of Agile through Scrum much better than how I have done this before.

1. **CI/CD**

Proficient: I used CI in my front- and back-end. CD only in the front-end because for the backend it is quite difficult to find a good platform for students without paying too much for a hosting. I integrated everything together with GitHub actions, when I push from the development branch, the CI and CD file are automatically executed and merged with the main branch.

CI/CD was completely new to me; I had never worked with this before. I learned that it brings a lot of value to applying this in a project, because of this a set of tests are re-run with every modification to keep track of whether everything is still working as it should. As a result, you don't have to keep track yourself after each modification to see if everything is still working. CD helps with a number of checks in deploying code. It also runs some tests, for example, to see if the website or program can still handle the load of many users.

1. **Cultural differences and ethics**

Proficient: I found this one a little trickier because I found the two a little harder to understand what they were. But I researched both of them I also wrote down my own experiences with them. From this it is possible to deduce what I experienced then and how I view it now.

I learned in cultural differences and ethics that there are all kinds of other cultures that you don't pay attention to in a normal conversation with other people. If you don't pay attention to another person's culture, you can say things that are taken negatively by the other person because of their culture but that you didn't mean at all.

1. **Requirements and design**

Proficient: For this, I used feedback from our stakeholder WoC in the group project during sprint deliveries. For both group and individual projects, I also set up a requirements file containing the user stories divided into two branches: functional and non-functional requirements. I also created a UX design and software architecture to better understand the project.

I didn't learn a whole lot in requirements and design; I already had a fair amount of knowledge about preparing requirements and a design.

1. **Business process**

Proficient: For the group project, we created different business processes. Not all are equally complex but they show what the products do in such a process.

In researching business processes, I learned how and what to use a business process for. It can help to create a business process prior before making a product how the business works now. Then at the end how it works after the product is made. That way you map out more of what your product can do, but also where you could improve a process.

At first I knew how to create a business process, but not exactly what I could use it for. Of course, there are a few more ways to apply a business process, these are described further in my research.

1. **Professional**

Proficient: While making the group project, we behaved professionally towards our stakeholder WoC. We also made a cooperation contract with the group together and we always followed well the methodologies we agreed on at the beginning.

With this learning objective, I learned a lot about communication to a stakeholder but also with my group at the group project. I learned how to behave at a delivery and in what tone and manner to communicate with the stakeholder. When there are others who have little or no knowledge of ICT it is also important that they can follow everything or as much as possible about what is being said.

In communicating within the group, I learned how to give good and clear feedback to group members. We also made a cooperation contract in which we wrote down how we agree everything with each other and when we work at school.