

# Semester 6 portfolio

Reading guide

# Table of contents

<b>Table of contents</b>	<b>2</b>
<b>Student Information</b>	<b>3</b>
<b>Introduction</b>	<b>4</b>
<b>Project overview</b>	<b>5</b>
<b>Self Assessment Overview</b>	<b>6</b>
<b>Proof of learning outcomes</b>	<b>7</b>
<b>Future-oriented Organisation</b>	<b>8</b>
<b>Investigative Problem-Solving</b>	<b>10</b>
<b>Personal Leadership</b>	<b>12</b>
<b>Targeted Interaction</b>	<b>14</b>
<b>Scalable Architectures</b>	<b>16</b>
<b>Development and Operations (DevOps)</b>	<b>18</b>
<b>Cloud Services</b>	<b>20</b>
<b>Security by Design</b>	<b>22</b>
<b>Distributed Data</b>	<b>24</b>
<b>Conclusion</b>	<b>26</b>

## Student Information

Student name	Ivan Georgiev Ovcharov
Student number	4090993
Study programme	ICT & Software Engineering
Semester	6

# Introduction

I am a software engineering student, currently following my 6th semester under the software engineering & ict specialisation. Previously, I took up course based software in semester 3, where I learned some key topics of what it takes to create a functional product.

In my fourth semester, I focused on academic preparation, where I underwent a mix of theoretical and practical courses, including one stationed at the Technical University of Eindhoven.

Recently, I've been shifting my focus to the business and entrepreneurship side of engineering. During my fifth semester, I had the opportunity to do an internship at a start-up where I talked with many executives from various firms. This experience really expanded my view and taught me some valuable soft skills.

Right now, I'm really excited about this semester because I want to dive more into the business processes and architectural design of building a software product. My goal is not just to develop a SaaS, but to polish it and put it out on the market while also learning more about the entrepreneurial side of things.

# Project overview

During this semester, development and research is split into two sections:

## ***Individual project***

A digital marketing/copywriting tooling platform that connects the power of OpenAI's GPT-3 AI model. It works by using ai priming and feeding techniques to create the best output possible. Furthermore, a social aspect is to be added, where people can share some of their best generated copywriting outputs or use other's templates. The purpose of this project is to generate fast and content-rich copy that gains traction for companies. Furthermore, the platform revolves around collaboration in a real-time text editor that can be used concurrently by up to 3 users.

## ***Group project***

Global accountancy firm, BDO, requires an updated tooling of one of their main extensions they use for audits in Excel. The application must be rebuilt by using their old codebase and further extended to work with some of Microsoft office's cloud applications. Furthermore, BDO has a set of updated user interface requirements that our project group should follow as a guideline.

# Self Assessment Overview

In order to correctly track the learning outcomes, as well as the technical skills, the following self evaluation schema is defined:

1. Identify strengths and weaknesses: Taking some time to reflect my skills and knowledge. What am I good at? What areas do I need to improve on?
2. Setting clear goals: Establishing clear, measurable goals for the project. The goals must be realistic, achievable and specific.
3. Regularly assessing the progress: checking the progress of the development as well as the research on a regular basis and comparing it with the set goals.
4. Seeking feedback: Asking for feedback from teachers, semester coaches, students and colleagues.
5. Continuously improve: Use self-assessment to identify areas where it can be improved. Regularly update goals and adjust the strategy as needed to ensure that there is a linear progression.

# Proof of learning outcomes

Semester six defines 9 key learning outcomes that create a clear and structured path to follow for getting an indepth understanding and experience with creating enterprise grade software.

The learning outcomes are defined as follows:

- 1. Future-oriented Organisation**
- 2. Investigative Problem-Solving**
- 3. Personal Leadership**
- 4. Targeted Interaction**
- 5. Scalable Architectures**
- 6. Development and Operations (DevOps)**
- 7. Cloud Services**
- 8. Security by Design**
- 9. Distributed Data**

In the following chapters, each LO is referenced, as well as all of the professional products and outcomes that are related to that LO.

# Future-oriented Organisation

To achieve a future proof product that meets the criteria and requirements of the user base, a set of new and updated technologies must be used. Furthermore, an architecture that supplements the requirements must be utilised to maximise the efficiency, as well as slowing down the outdating of the application.

To deal with this, the following set of standard technologies has been chosen to ensure the application is not only efficient, but the technology in question is up to date.

**Backend technologies:** FastAPI python | .NET Core C#

**Frontend technologies:** Vue.js

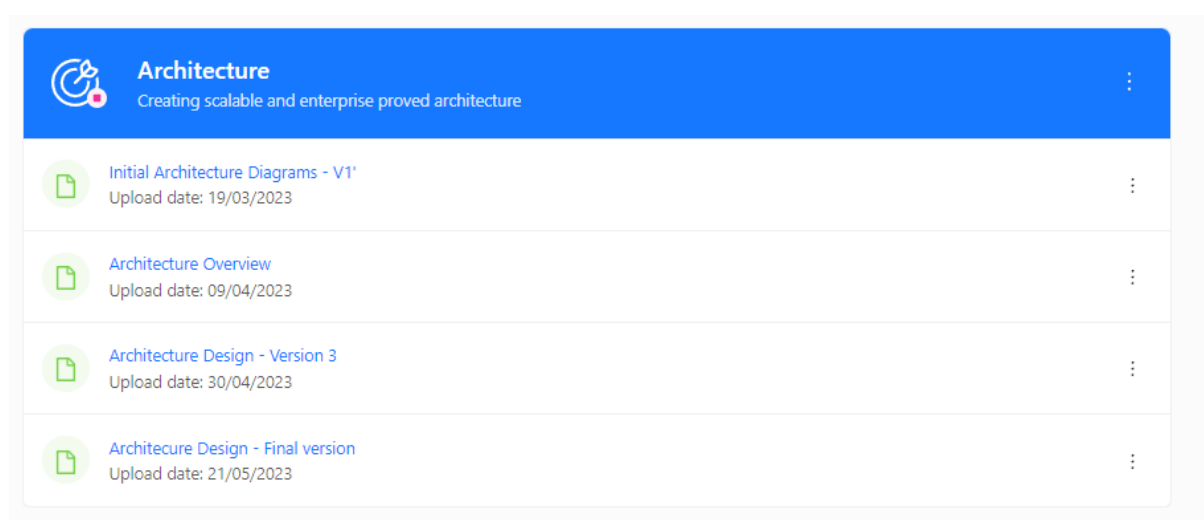
**Database:** MongoDB, Postgres

Furthermore, the architectural choice is a mix of microservices, as well as some monolithic features to ensure that the application is decoupled, but not too difficult to maintain.

Professional products provided are the project plan, as well as the initial architectural diagram, provided within the portfolio section.

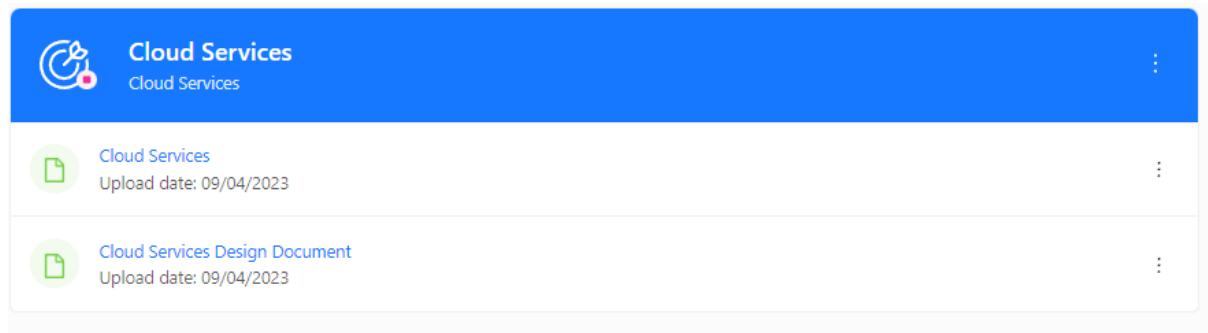
## Resources for this learning outcome:

**Architecture document** - describes the underlying architecture of the system. Also argues about each design decision and why it complies with industry standards/proves to be scalable in the future.





**Cloud services document** - goes over what 3rd party services Copycloud has delegations to and describes why each one is used and how it is future proof.



Copycloud has reached a state where it is GDPR compliant with its data storage/collection. Furthermore, the development approach is within the compliance of enterprise industry standards and uses microservices for delivering its services.

The aim is not to complete Copycloud, but to provide a robust and scalable minimum product that solves the number one problem that Copycloud is aiming to address.

### ***Self assessment and next steps:***

**Completeness:** Profficient

**Context:** Copycloud has reached a state where all of the underlying architecture is designed in a way which is horizontally and vertically scalable. Furthermore, all of the 3rd party delegations to different technologies are based on design choices which comply with industry standards. Overall, the application is future-proof and can easily be broken down/changed/upgraded if demand increases.

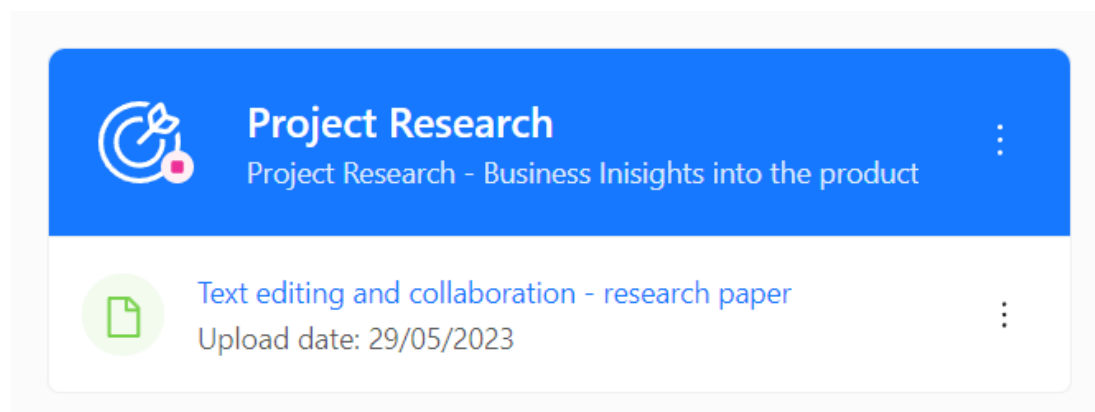
# Investigative Problem-Solving

To cover the investigative problem solving learning outcome, the following plan is defined:

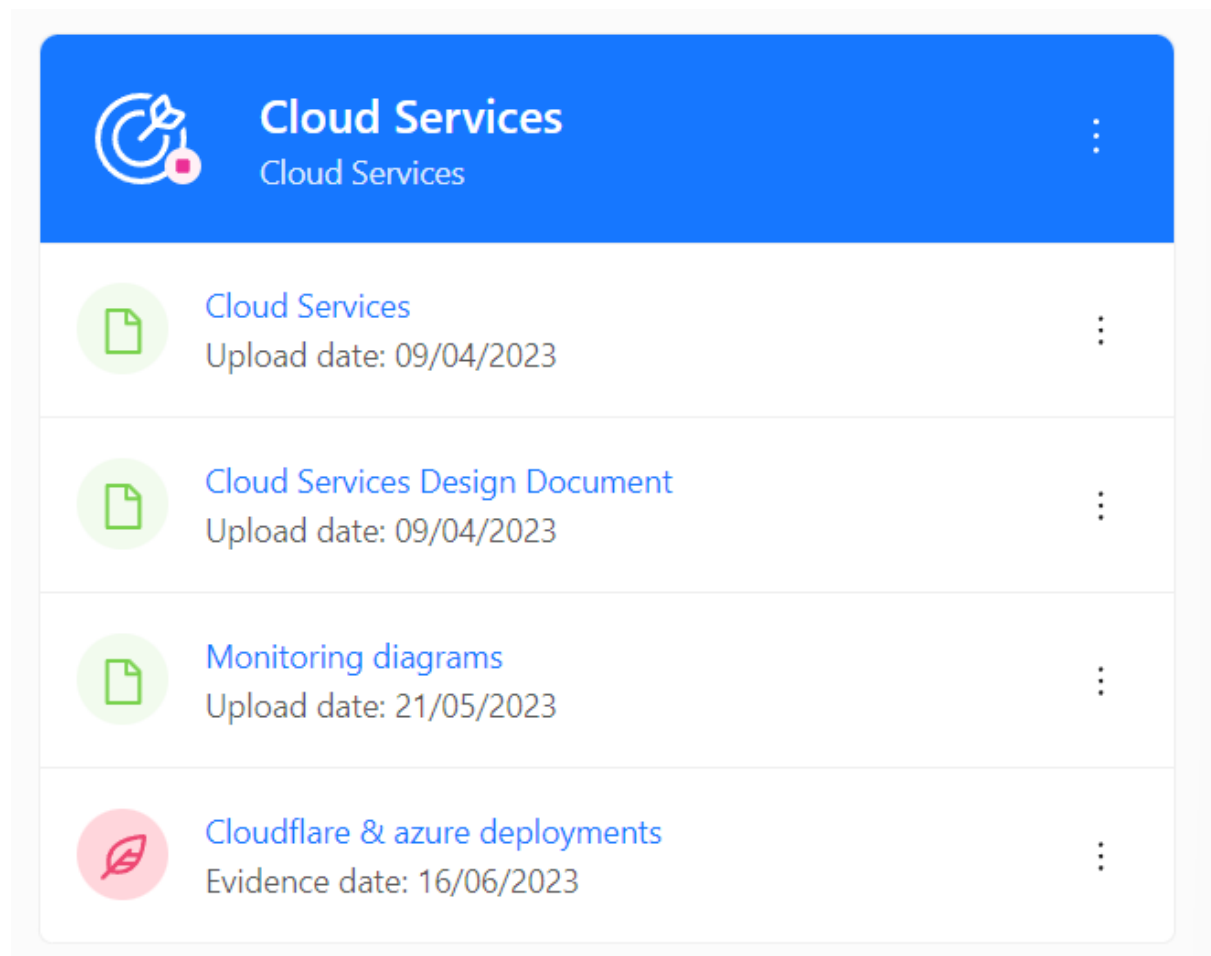
1. Develop critical thinking skills: analysing problems and already available products
2. Learn established methodologies: Familiarise myself with established methodologies such as the DOT framework, which can provide a structure for the investigations.
3. Analyse problems from multiple viewpoints: Taking the time to analyse problems from multiple angles.
4. Validate findings: Making sure that any investigations are understandable, repeatable, and validated by others. This can be done through peer reviews or teacher feedback
5. Presenting work professionally.
6. Keeping track of ongoing investigations

## Resources for this learning outcome:

### Research plan documentation (DOT framework research)



## Cloud services solutions document



### ***Self assessment and next steps:***

**Completeness:** Profficient

**Context:** During the conceping -> developing -> improving phases, a lot of new technologies, methodologies and non-technicalities have been learned along the way. This involves both the individual project (Copicloud), as well as the group project (BDO).

The research for both the individual and group projects are complete and are now being fine-tuned and improved with more resources and better arguments about certain topics.

# Personal Leadership



Personal leadership is an essential part of career development because it means taking charge of your growth and development. In order to acquire skills and go forward, it is necessary to make a learning plan and set goals that go beyond the requirements of this semester.



The following plan is defined for the best results:



- Start by assessing your current skills and knowledge in software development. Identify areas where you need to improve and set specific goals for yourself.
- Set a regular schedule for learning and practising your software development skills. Make sure to prioritise this time and treat it as you would any other important commitment.
- Seek out opportunities to work on challenging software development projects. Look for opportunities to collaborate with other developers or work on open-source projects to gain experience and build your portfolio.
- Attend industry events and university events to advance with technologies and best practices.

## Resources for this learning outcome:



**DevOps operations document:** This document serves as all of the non-technical outcomes that have been achieved during the semester.



 **DevOps**  
Development and Operations (DevOps) 

 DevOps strategy plan  
Upload date: 01/05/2023 

 DevOps document - final version  
Upload date: 21/05/2023 

## Graduation Preparation

 **Graduation prep** 

 Graduation preparation  
Upload date: 29/05/2023 

**Portfolio itself under the portfolio tool:** Everything included in the portfolio contributes to this learning outcome. Furthermore, leadership has been taken not only in the individual project, but also in the group project. A lot of design choices and non-functional requirements have been personally suggested and improved the overall software/customer's expectations.

***Self assessment and next steps:***

**Completeness:** Profficient

# Targeted Interaction





To cover the Targeted Interaction learning outcome, I need to ensure that I communicate appropriately based on my role in the team, the audience, and the medium used. Together with my team, we must establish a professional way of working that follows agile software development processes such as scrum to communicate with stakeholders about our progress and results. My behaviour should align with this chosen way of working to ensure that we meet our objectives.

I must also actively share my ideas, technical knowledge, and experiences both within and outside of the team to contribute to improving the software development process. In addition to considering the requirements of direct stakeholders, I must also take into account other relevant viewpoints such as GDPR, ethical and legal issues.

Furthermore, collaboration with other members from this semester's group or other students/teachers from the semester is a necessity in order to address all best practices of enterprise software.

## Resources for this learning outcome:





**GDPR compliance document & GDPR for the saving/encryption of documents:** The aforementioned documents include a breakdown of why the application is compliant with GDPR at its current state.




 <b>Distributed Data</b> Enterprise data organization		
	Distributed Data Choices Upload date: 09/04/2023	⋮
	GDPR Compliance for saving documents Upload date: 30/04/2023	⋮
	GDPR Compliance document - Copycloud Upload date: 21/05/2023	⋮

## Group project plan, ethical choices and research plan documents

Furthermore, this learning outcome involves all of the group work that has been done over the semester. This includes the ethical design document, project plan and research plan which have all been worked on by the entire team, split up over the semester.

## Peer feedback from feedpulse

Targeted Interaction		
	<a href="#">Ethical Design</a> Upload date: 21/05/2023	⋮
	<a href="#">Group project - plan document</a> Upload date: 21/05/2023	⋮
	<a href="#">Group project - research document</a> Upload date: 21/05/2023	⋮
	<a href="#">Peer feedback</a> Upload date: 21/05/2023	⋮

Future Organization		
	<a href="#">Transferability document</a> Upload date: 16/06/2023	⋮
	<a href="#">Project Plan Group Project</a> Upload date: 16/06/2023	⋮
	<a href="#">Group project - reflection</a> Upload date: 18/06/2023	⋮



### ***Self assessment and next steps:***

**Completeness:** Proficient

**Context:** During this semester, our group has gone through a lot of changes, both improvements and mistakes to learn from. One of the most important things to note is that the project group was half of what is expected, yet the tasks were split up correctly and communication was never an issue. I believe this was a great learning experience, as it allowed us to learn in a real world scenario where groupmates might leave and more work/better communication must be achieved.

## Scalable Architectures

In order to create a software that complies with enterprise industry standards, a lot of research must be done towards choosing the best practices for data storage, business logic separation and scalability. One of the most important aspects of any enterprise software product is the underlying architecture behind it. Without a proper structure, no matter what the functionality of the application may be, it can be bottle-necked by the lack of scalability.







In the architecture section of the portfolio, a document explaining the choices behind the architecture has been provided. Furthermore, separate instances of business logic and how they comply with the rest of the architecture have been provided as evidence of the learning outcome.






In the latest version of the architecture document, a clear overview of how documents are saved can be seen. Furthermore, some of the pitfalls connected with saving documents in a shared/collaborative environment have been outlined.

## Resources for this learning outcome:

**Architecture Design Document:** This document describes the architecture of the entire underlying system of Copycloud. It doesn't only give a high overview of the communication between applications, but gives specific cases and where issues might arise/how to solve certain problems

## Individual architecture cases (diagrams)

 <b>Architecture</b> Creating scalable and enterprise proved architecture		
	<a href="#">Initial Architecture Diagrams - V1'</a> Upload date: 19/03/2023	⋮
	<a href="#">Architecture Overview</a> Upload date: 09/04/2023	⋮
	<a href="#">Architecture Design - Version 3</a> Upload date: 30/04/2023	⋮
	<a href="#">Architecture Design - Final version</a> Upload date: 21/05/2023	⋮
	<a href="#">Individual Architecture Cases</a> Upload date: 21/05/2023	⋮

 <b>Scalability</b>		
	<a href="#">Workloads - Single Instance Deployed</a> Upload date: 16/06/2023	⋮
	<a href="#">KCluster Services &amp; Ingress</a> Upload date: 16/06/2023	⋮
	<a href="#">Scaling services</a> Upload date: 16/06/2023	⋮
	<a href="#">Deployment Email Service Scaled To Two</a> Upload date: 16/06/2023	⋮

### ***Self assessment and next steps:***

**Completeness:** Profficient

**Context:** This semester served as an immense learning experience and I believe scalable architecture was the one of the biggest parts. Because of this semester, I managed to understand the core difference between having an application that is built up by multiple microservices/monolithic approach. Furthermore, this inspired me to get out on my own and seek external resources (books) for microservices and their advantages/disadvantages.

# Development and Operations (DevOps)

In order to deliver the product in a scalable way and prepare it for deployment, it must be packaged together for convenience and usability.

For this, Docker has been used in order to modularize the code and have it ready for deployment. All of the necessary configurations for the rest of the services have been added in an encrypted way, so that if development must be passed onto another team, it would be done without the exposure of any sensitive credentials.

The current configuration of the dockerized microservices can be seen in the DevOps section of the portfolio.

Furthermore, Copycloud now uses a CI pipeline by using Azure boards's inbuilt CI-CD system. This also includes coverage by integration tests/unit tests. On top of that, the pipeline also includes automated codequality assurance delegated to sonarqube.

















For monitoring, Copycloud currently uses Azure's out of the box monitoring tools for different sides of the application. This involves tracking the incoming/outgoing messages, emails, as well as traffic for the file storage system.

To track the incoming users, Firebase provides in-depth analytics tools that show how often users use the application/for what periods of time they stay within the application.

## Resources for this learning outcome:

**Copycloud devops document:** This document describes the architecture of the entire underlying system of Copycloud. It doesn't only give a high overview of the communication between applications, but gives specific cases and where issues might arise/how to solve certain problems.

**Monitoring diagrams:** This involves all of the out of the box monitoring tools that come with Azure services, Codox, Sonarqube and Google

 <b>DevOps</b> Development and Operations (DevOps) 		
	<a href="#">DevOps strategy plan</a> Upload date: 01/05/2023	
	<a href="#">DevOps document - final version</a> Upload date: 21/05/2023	
	<a href="#">Monitoring diagrams</a> Upload date: 21/05/2023	
	<a href="#">Dockerhub</a> Upload date: 21/05/2023	
	<a href="#">Cloudflare DNS Rule &amp; Application Gateway (Azure ingress controller)</a> Evidence date: 16/06/2023	
	<a href="#">Azure Pipeline - Build, Test, Static Code analysis &amp; push to dockerhub</a> Evidence date: 16/06/2023	
	<a href="#">Quality Assurance Document</a> Upload date: 19/06/2023	

## **Completeness: Proficient**

**Context:** Monitoring and dev operations are extremely powerful in both software development and non-functionals, such as product delivery or creating a feedback loop. This semester has been a great learning experience when it comes to using different tools to both monitor and diagnose different applications. What is left is adding automatic deployment and monitoring that as well.

## Cloud Services

CopyCloud is a digital marketing platform that enhances creators' creativity and productivity with the use of artificial intelligence. Furthermore, the platform has a social aspect, in the sense that users can share their documents/marketing copy generations with other users. Users can also collaborate together in a shared project.

In order to satisfy the above mentioned requirements, the platform needs to be both performant and reliable. This means that no matter how much the user base grows, the technologies must be used in an extendable manner and should scale vertically.






There are many providers out there, all with different pricing plans and benefits, but the most popular are AWS, Azure and Google's solutions. The choice between those is usually decided between the pricing options, as well as the compatibility with the product's technology stack.

To best satisfy this requirement, a breakdown of all of the cloud services and the reasoning behind each choice has been provided in the Cloud services section of the portfolio.

**Resources for this learning outcome:**

**Cloud services design document:** This document is a breakdown of each individual cloud service that is being used within the Copycloud system. It also includes an argument per each design decision and why some are used over others.

**Monitoring diagrams:** This involves all of the out of the box monitoring tools that come with Azure services, Codox, Sonarqube and Google

 Cloud Services		
Cloud Services		
	Cloud Services Upload date: 09/04/2023	⋮
	Cloud Services Design Document Upload date: 09/04/2023	⋮
	Monitoring diagrams Upload date: 21/05/2023	⋮
	Cloudflare & azure deployments Evidence date: 16/06/2023	⋮

**Completeness:** Proficient

**Context:** This semester has been a prime example of why when building software, a lot of system design choices(authentication, database, events, etc) should be directly delegated to an already

established and standard-compliant 3rd party. There is no need to reinvent the wheel unless the requirements explicitly require so.

## Security by Design

In order to provide a secure and scalable enterprise software that complies with standards, it is necessary to define a plan that outlines all of the potential security pitfalls.

As a software developer, I understand that security is an important aspect of any application. To ensure that my application is secure and minimise security risks, I will incorporate security by design into my software development process. This security plan outlines how I can minimise security risks for my application and incorporate best practices in my software development process.

Security is a critical aspect of software development, and I recognize the need to minimise security risks for my application. To achieve this, I will take a proactive approach and incorporate security by design in my software development process.

### **Resources for this learning outcome:**






**Security plan:** This document is a breakdown of each individual step that is taken for ensuring security by industry standards.









**GDPR Data security**

**Keycloak Docker**

**Firebase authentication:** in order to delegate the safe storage of sensitive user information/passwords, firebase is used. This provides the ability to have traditional email + password registration, but also gives the ability to easily integrate with Google/Facebook/Github or other 3rd party providers using Oauth



 <b>Security by Design</b> <span>⋮</span>		
Minimize security issues		
	<a href="#">Security Plan</a> Upload date: 09/04/2023	⋮
	<a href="#">GDPR Data Security for documents</a> Upload date: 01/05/2023	⋮
	<a href="#">Firebase Authentication</a> Upload date: 21/05/2023	⋮
	<a href="#">Keycloak Docker</a> Upload date: 21/05/2023	⋮

 <b>Security by Design</b> <span>⋮</span>		
Minimize security issues		
	<a href="#">Security Plan</a> Upload date: 09/04/2023	⋮
	<a href="#">GDPR Data Security for documents</a> Upload date: 01/05/2023	⋮
	<a href="#">Firebase Authentication</a> Upload date: 21/05/2023	⋮
	<a href="#">Keycloak Docker</a> Upload date: 21/05/2023	⋮
	<a href="#">Unit tests of application</a> Upload date: 16/06/2023	⋮
	<a href="#">HttpOnly cookies against XSS attacks</a> Upload date: 16/06/2023	⋮
	<a href="#">OWASP Top 10 - Copycloud</a> Upload date: 18/06/2023	⋮

**Completeness:** Proficient

**Context:** Over this semester, it has been a great learning experience to see how many other non-functional parts there are about building software. Security is one of the most crucial things when it comes down to making something reliable and also compliant by standards. Overall, the application using a lot of security measures that are followed by most companies. The only things that are left is the full completion of using keycloak within Docker and having sensitive data be injected by the Azure pipeline.

## Distributed Data





Developers are required to use best practices for distributed data across the whole development process, for both non-functional and functional requirements, while taking legal and ethical considerations into account (Learning Outcome 9 - Distributed Data). This entails converting functional and non-functional requirements into precise data requirements and looking into real-time and permanent data storage options that also fit the architecture. The system's design and execution must adhere to legal mandates like GDPR. Data design ethical considerations must also be made. The current software development procedure should be adjusted to include the procedures required for creating with distributed data in mind.

To describe this in further detail, a markdown document has been delivered as evidence in the distributed data section of the portfolio tool. Furthermore, a GDPR compliance document has been added for the saving of different documents by using the Copycloud system.

### Resources for this learning outcome:

**GDPR Compliance document - Copycloud:** This document explains in detail of what step that has been taken towards complying with GDPR looks like. In the case of Copycloud, this involves two very specific use cases that are described in a problem-solution way.

**Distributed Data Choices:** This document touches on the choices of data distribution within the system. This includes how certain users/content created by them is saved such that there is no need to duplicate data. Furthermore, it touches on the idea of having different databases for each application and using libraries to reproduce code.

 <b>Distributed Data</b> Enterprise data organization		
	<a href="#">Distributed Data Choices</a> Upload date: 09/04/2023	⋮
	<a href="#">GDPR Compliance for saving documents</a> Upload date: 30/04/2023	⋮
	<a href="#">GDPR Compliance document - Copycloud</a> Upload date: 21/05/2023	⋮

**Completeness:** Proficient

**Context:** This semester has helped with the idea of concepting and brainstorming everything before actually going and implementing. It has also touched on the idea of making smart design decisions with how data is stored/deleted/distributed from the get-go, so it is also future proof. Overall, I believe this learning outcome has been satisfied.

# Conclusion

This semester has been a valuable learning experience in various aspects of software development. Throughout the conceiving, developing, and improving phases, we have acquired new technologies, methodologies, and non-technical skills. Both the individual project (Copycloud) and the group project (BDO) have been thoroughly researched, fine-tuned, and improved with additional resources and stronger arguments.

Personal leadership has played a significant role in our career development. By taking charge of our growth and development, we have identified areas for improvement and set specific goals in software development. We have committed to a regular schedule of learning and practicing our skills, sought out challenging projects, and actively shared ideas and experiences with others.

Effective communication, targeted interaction, and collaboration have been essential in achieving our objectives. We have established professional ways of working, adhering to agile software development processes like Scrum, and communicated progress and results to stakeholders. We have considered multiple viewpoints, including GDPR compliance, ethical considerations, and legal issues. Collaboration with team members and other students/teachers has been a key part of addressing best practices in enterprise software