# Introduction

The purpose of this portfolio reading is to outline my work during the Advanced Software semester. The portfolio will be split into several sections that will focus on different parts of my developments and achievements during this semester.

## Personal introduction

My name is Mihail Vasilev, I come from Bulgaria and I am decided to study at Fontys because I saw a great opportunity for achieving my personal goals to becoming a computer science professional. So far, Fontys has allowed me to gain a significant amount of knowledge and experience and I believe that my studies will play an important part in my carrier. After I finish Fontys I want to pursue a Masters degree in the TU/e.

As a more personal note, I am interested in a lot of subjects different from computer science as well such as sports, music, games, movies and travelling. I practice martial arts such as karate and aikido. I love going on hikes in the mountains and travelling abroad. I have been playing computer games since I was very young and going to the movie theater has been a major part of my life. I also have been learning to play the guitar for some time now.

## Technical knowledge

**Proficient in the programming languages:**

* Java, C#, Python, React, HTML/CSS, Javascript, Typescript, C, C++, Elm, SQL and MySQL, PowerShell

**Proficient in the following technologies:**

* .Net WinForms, .Net Core Razor Pages, Java Spring Boot, Axios, RESTful API, Git, Atlassian Bamboo

**Software development standarts and methodology:**

* Waterfall methodology
* Agile methodology
* Scrum methodology
* Test planning and QA
* Requirement Documentation
* Complex problem-solving
* SOLID design principles
* CICD development
* Jira

## Goals and what I want to improve

**Technical knowledge**

* Learn how to use microservices
* Learn how to deploy on the cloud
* Learn how to test and develop applications that can handle big loads of users
* Improve my knowledge on security

**Soft skills**

* Improve my abilities to plan my tasks accordingly
* Improve my abilities in terms of communication to the stakeholders
* Improve my writing skills
* Improve my research abilities

# Projects

In this section I will explain briefly the projects that I will be working on. During this semester I will be working on two projects: Individual project and Group project.

For more detailed information, please refer to the respective documents inside the Learning outcomes deliverables.

## **Individual Project - HeardIT**

## Context

HeardIT is a music sharing platform where you will be able to discover, listen and learn how to play to your favorite songs from a plethora of indie bands. The website focuses on small to medium music creators and people interested in learning how to play the songs on their instruments. The application provides several features that allow users to have an interactive experience combining the listening and learning aspect in one easy-to-find place.

Songwriters will have the ability to upload their tracks, the chords/tabs, lyrics and any other information that will allow their fans to be able to not only listen to the songs but also learn to play them.

Fans will be able to experience these features easily through the interactive user interface and will be able to leave comments, likes and make playlists with their favorite songs.

This way HeardIT will be a place where music creators and fans will have the opportunity to interact, share their experience, learn and get closer to the art of music together.

## Goal of the project

The goal of the HeardIT music sharing application is to provide its users with a place where they can share, enjoy and learn their favorite music. The application will occupy the niche of being a music sharing platform where users can not only find the tracks from their favorite artists but also the chords and lyrics that they can learn so that they can play/sing along with the songs.

In technical terms, the main goal of the project is to create a scalable, reliable and user-friendly web-application that follows the established enterprise standards for developing mainstream software services. The project will focus on delivering a working solution capable of passing the modern requirements for software solutions. The application will follow the modern principals of software developing, utilizing the most suitable technologies, software architecture principles, the best practices and methods of testing. HeardIT will be a modern application that lives up to the high standards of the modern IT world.

## Conditions and technologies

**Technologies include:**

* Back-end and services: Java SpringBoot
* Front-end: ReactJs
* Git
* Database: MySQL
* Deployment: Docker, Kubernetes

**Work strategies include:**

* Agile
* Scrum

### Repositories:

Back-end services and documentation: <https://github.com/Jumorto/HeardIT>

Front-end: <https://github.com/Jumorto/HeardIT-FrontEnd>

## **Group Project -** Build a YAML code generator to deploy an application on Kubernetes

## Context

SUE is a prominent Cloud Native Solutions organization based in the Netherlands and recognized as one of Europe's largest in its field. SUE specializes in Cloud and IT services and focuses on ensuring the smooth and seamless interaction between applications, services, and processes with its Cloud Native Framework. The team of certified Cloud and IT engineers is committed to providing a comprehensive range of services and solutions making them one of the leaders in businesses seeking Cloud Native solutions.

A major component of the modern Cloud based solutions is the use of containerization. Using technologies like Docker and Kubernetes allows for more efficient resource use, faster deployment, and better scalability. Creating and deploying the Kubernetes YAML configurations can be a long and time-consuming process which requires a significant learning curve. An interactive and user-friendly web interface that allows users to develop and apply these configurations, simplifies the processes, and lowers the barrier to entry for inexperienced users.

## Goal of the project

The goal of the project is to implement a web-based, interactive application tool for defining and applying Kubernetes YAML configurations to a cluster. The main advantage that this application will provide is the ability to simplify the otherwise cumbersome process of creation of the YAML configuration files that are needed for the creation of the Kubernetes clusters. The current process of creating such files requires significant learning curve and knowledge and a way to instead generate these files through a web-based application would benefit SUE’s customers.

To achieve this goal, an investigation of the process of creating and applying Kubernetes YAML files will be performed. An interactive user-interface will be created and implemented using the appropriate technologies and the application will be connected to the official Kubernetes API. Once the web-based application is created, proper and up-to-standard testing will be performed to ensure the quality of the product.

## Conditions and technologies

**Technologies include:**

* Back-end and services: Golang
* Front-end: ReactJs
* Git
* Docker and Kubernetes

**Work strategies include:**

* Agile
* Scrum

### Repositories:

k8s-api-spec: <https://projects.fhict.nl/s6-rb/spring-24/rb04/sueyamlgenerator/k8s-api-spec>

quartermaster-frontend: <https://projects.fhict.nl/s6-rb/spring-24/rb04/sueyamlgenerator/quartermaster-frontend>

# Learning outcomes

In this section I will focus on the learning outcomes. I will explain my self assessment as well as point to specific deliverables to prove that I have achieved the appropriate level for each of the learning outcomes. The exact products and deliverables will be available inside the **Evidence** section in my portfolio. This section will be split into **Sprints** so that my progress can be observed easily.

## Self assessment

1. Professional Standard - **Advanced**
   * What I need to prove? - This learning outcome focuses on the professionalism that I must display during this semester. It applies to all parts of the development process, participating in meetings with the teachers, product owners and my team members. Delivering professional products within the established deadlines and constraints is also a major part of proving this learning outcome. Applied research will be a vital part of the development process. This research will allow me to make better decisions during all phases of the project while also taking into consideration the scope, relevancy and any other substantial context that might arise. The proof for this learning outcome will be all the of the professional products that I deliver and all the related documentation, process reports and research that was conducted during this semester.
   * Evidence:
     + Individual project: @Project Pitch -HeardIT , @Project Plan - HeardIT , @Research Plan - HeardIT, @User Requirements - HeardIT, @Individual project: Sprint 1 (Week 5), @Individual project: Sprint 2 (Week 8), @Individual project: Sprint 3 (Week 11), @OWASP Security report - HeardIT, @Individual project: Sprint 4 (Week 14)
     + Group project: @Group project: Sprint 0 (Week 3) , @Group project: Sprint 1 (Week 6) , @Group Project - Design Oriented Research: Plan (Week 5) , @Ethical design - Short report about Ethical Requirements (Week 8) , @Group Project Plan , @Group Project requirements, @Group project: Sprint 2 (Week 9) , @Group project: Sprint 3 (Week 12)
   * Reasoning:
     + Sprint 5 - This is the final sprint of the semester. During this period, I had a discussion with all three teachers about my progress and for this learning outcome I was graded with Advanced by them. This is not the only reason why I am grading myself with Advanced though. I believe I have shown throughout the whole semester that my work and my work methodology is up to the modern standards for professionalism. I have shown that I can receive and implement the feedback into my works and I have demonstrated my dedication to delivering a proper and well researched solutions to the issues that I have had to deal with. For this final sprint, I have once again updated and improved my portfolio and my project. New documents have been created and previous ones have been updated. Both the deadlines for my individual and group projects have been met. For these reasons I feel confident that my professional standards stands at an **Advanced** level.
     + Sprint 3 - 4 - My reasoning for this sprints remains mostly the same as from the previous sprint, with the difference that I have improved my portfolio according to the feedback and I have created several new documents that further explain my decisions that I took during this period. I have also included the new updates and research that was finished during sprint three. For these reasons I feel confident that my level of professionalism is at the **Proficient** level.
     + Sprint 2 - My reasoning for this sprint remains mostly the same as from the previous sprint, with the difference that I have updated my portfolio according to the feedback, as well as added all of the previously missing documents and proof. I have also included the new updates and research that was finished during sprint two. For these reasons I feel confident that my level of professionalism is at the **Proficient** level.
     + Sprint 1 - The main reasoning for self assessing with **Proficient** for this LO is for the reason that I have already completed several projects that required similar approaches in order to finish them. Over the past several semesters I have gathered a lot of experience into how to research, communicate with stakeholders, develop and deliver applications up to the modern standards and requirements and produce real working solutions. All these factors apply to show why I feel confident to put **Proficient** for this LO.
2. Personal leadership - **Advanced**
   * What I need to prove? - Personal leadership is a major part of this semester’s structure since we have a lot of freedom to choose not only our project and technologies but also the process that we are going to undertake. The planning, research, design and FeedPulse documents will be the main proof for this learning outcome. Each part of the assignment will be carefully planned, researched and developed by me and I will be the main person responsible for delivering the final products. Another very important part of showing my personal leadership will be my feedback sessions with my teachers. Regular meetings with them will be scheduled and attended. This will be mainly shown in the FeedPulse reports that are created after each meeting with each teacher as well as applying the feedback and improving upon it with every new sprint.
   * Evidence:
     + Individual project: @Project Pitch -HeardIT , @Project Plan - HeardIT , @Research Plan - HeardIT, @User Requirements - HeardIT, @Individual project: Sprint 1 (Week 5), @Individual project: Sprint 2 (Week 8), @Individual project: Sprint 3 (Week 11) , @Individual project: Sprint 4 (Week 14)
     + Group project: @Group project: Sprint 0 (Week 3) , @Group project: Sprint 1 (Week 6) , @Group Project - Design Oriented Research: Plan (Week 5) , @Ethical design - Short report about Ethical Requirements (Week 8) , @Group Project Plan , @Group Project requirements
   * Reasoning:
     + Sprint 5 - During the last sprint of this semester, I had a discussion with all three teachers about my progress and for this learning outcome I was graded with Advanced by them. This is not the only reason why I am grading myself with Advanced though. This semester's structure and approach in teaching relied heavily upon us students to be the leaders of our projects and show that we are capable of overcoming the many problems and issues that arise during the development an enterprise application on our own. I believe that that this was a great challenge that allowed me to become more confident in my skills and allowed me to improve my organizational and planning abilities. I learned many new technical skills and I had the opportunity to experience what working on a real project would be [like. In](http://like.In) the real world, it is of great importance that developers can accurately research and determine themselves what the best solutions to their problems are. I believe that I have shown throughout the whole semester period that I can capable of leading the projects that I am involved in. For these reasons, I grade myself with **Advanced** for this learning outcome.
     + Sprint 3 - 4 - My reasoning for this sprints remains mostly the same as from the previous sprint, with the difference that I have improved my portfolio according to the feedback and I have created several new documents that further explain my decisions that I took during this period. I have also included the new updates and research that was finished during sprint three. During this sprint I managed to complete a lot of work about the general structure and I had to redesign a big part of my application's architecture and deployment. All of that is documented in the appropriate research reports. For these reasons I feel confident that my level of personal leadership is at the **Proficient** level.
     + Sprint 2 - My reasoning for this sprint remains mostly the same as from the previous sprint, with the difference that I have updated my portfolio according to the feedback, as well as added all of the previously missing documents and proof. I have also included the new updates and research that was finished during sprint two. I have improved upon what was required from me and this can be seen in all of the documents stated in section Evidence. For these reasons I feel confident that my level of personal leadership is at the **Proficient** level.
     + Sprint 1 - The reasoning for self assessing with **Proficient** for this LO also stems from the reason that I have already completed several projects in the past that required similar approaches in order to implement them. Over my previous assignments I have gained significant experience and I feel confident in my abilities to personally lead my projects forward. These factors apply to show why I feel confident to put **Proficient** for this LO.
3. Scalable Architectures - **Proficient**
   * What I need to prove? - Creating applications with professional architecture that meets the criteria for the enterprise software requirements is a major part of this semester. Both the individual and group projects will be applications that follows the modern strategies to create a future-proof enterprise level application. As such, extensive research, development and quality control will be conducted during the creation of the applications. The main proof for this learning outcome will be the URS and design documents, architecture research and design documents, product reports and testing reports that will be created during the development of the applications the meet the modern quality standards.
   * Evidence:
     + Individual project: @Project Pitch -HeardIT , @Project Plan - HeardIT , @Research Plan - HeardIT, @User Requirements - HeardIT, @Research-Architecture-HeardIT, @Research-CloudDeployment-HeardIT, @Research-DataDistribution-HeardIT
     + Group project: @Group Project Plan , @Group Project requirements
   * Reasoning:
     + Sprint 5 - During the last sprint of this semester, I continued to add upon the previously existing architecture by implementing new features such as a comments section for my users and the ability for my backend services to communicate better using message brokers. This was done in accordance with the previously established architecture principles and all deployments and CICD pipelines have been updated to accommodate for the new features. During this sprint I also worked on a better way to establish database scalability, by establishing database replication, which improves my database reliability and scalability. This has been described in detail in @Research-DataDistribution-HeardIT - sections 3.5 and 3.6. Scalable architectures is an expansive topic that has many different aspects that can be further addressed. However, due to my time constraints I believe that I have managed to extract the essence and I have managed to show that in my project. During this sprint I had a discussion with all three teachers about my progress and for this learning outcome I was graded with Proficient by them. Due to the nature of the scalable architectures topic I believe that this semester project has given me a great opportunity to start learning about and creating scalable and robust applications but I believe that there is still much to learn. For these reasons, I grade myself with **Proficient**.
     + Sprint 3 - 4 - During these sprints I had to implement the architecture design that I had researched during Sprint 2. This was the main focus and topic that I worked on. I realized that in order to properly do load testing on my application services, I had to re-design the deployment of the application to suit the new architecture - for more information, refer to @Research-CloudDeployment-HeardIT. In the end the application was deployed to Google Kubernetes Engine and the automatic load testing was added to the CICD pipeline. During this redesigning period, I also did the @Research-DataDistribution-HeardIT which allowed me to better design and implement my data storage systems which impacted the scalability of the application. This means that at this point, I have a fully functional application that is capable of handling significant load and is deployed both to Google Cloud and to NetLab (for the load testing). For these reasons, I believe that I have successfully achieved a **Proficient** level on this learning outcome since I have put to practice the research that was done.
     + Sprint 2 - During this sprint I conducted a deep dive research into what types of architectures are available and which one would be the best suited for my project. Thanks to this research I have a better idea as to how to create my application so that it meets the modern standards for scalable applications. For more information about the specifics, refer to @Research-Architecture-HeardIT . I also spent a significant amount of time researching and working on understanding and applying the practices of scalability in the cloud which can be seen in @Research-CloudDeployment-HeardIT . Overall, I have some good progress regarding the architecture of my application. I still think that my level is at **Beginning** because I want to further apply these concepts in my application. Next sprint I will work more on applying these concepts instead of just researching them.
     + Sprint 1 - My reasoning for this LO is that I have started doing some first research and working on creating the first architecture diagrams for my individual project. However, there is a lot more to be done and for this reason I believe that **Beginning** is suitable at this stage of the project.
4. Development and Operations (DevOps) - **Proficient**
   * What I need to prove? - Continuous software development is situated at the core of modern software development theory and is a vital part of my semester’s projects. The CI/CD environment that will take care of the automated testing, quality control, deployment and delivery of the applications. Extensive and detailed research and development will be conducted in order to establish a proper CICD environment. This will be beneficial to my development process since establishing it will allow me to be more productive and effectively deliver. As such appropriate documentation that focuses on the DevOps part of the assignment will be created that goes into detail of how each part of the Continuous Integration and Deployment/Delivery is employed. These documents as well as the real set-up of the DevOps environment will be the proof for this learning outcome.
   * Evidence:
     + Individual project: @Project Pitch -HeardIT , @Project Plan - HeardIT , @Research Plan - HeardIT, @User Requirements - HeardIT, @Research-Architecture-HeardIT, @Research-CloudDeployment-HeardIT, CICD yaml file and Dockerfile in the Git repo
     + Group project: @Group Project Plan , @Group Project requirements
   * Reasoning:
     + Sprint 5 - During this sprint I continued to improve upon the established DevOps pipelines that I have established. The new features that were created were included into the pipelines and deployments. At this point I had already established a proper pipeline that can build, test and deploy my application services to the cloud without issues. I continued to update and maintain it so that the development process could be smooth and consistent. During this sprint I had a discussion with all three teachers about my progress and for this learning outcome I was graded with Proficient by them. DevOps is a very expansive topic that requires a lot of experience and learning to be a proper professional in. I believe that I have managed to learn and show the core of the DevOps principles and methodologies with my project. However, I believe that there are many specific aspects that can further expanded upon and that can only be learned through experience. For these reasons, I grade myself with **Proficient**.
     + Sprint 3 - 4 - During sprint 3 and the half of sprint 4, at the time of this submission, I had to do a big re-design of my application. This also included updates to the CICD pipeline. At this stage, I have a new and updated pipeline that can build, test and deploy all of my services to the Google Kubernetes Engine cluster and also can perform load testing by connecting to the Fontys NetLab and executing the load tests to my deployment there. This has been all explained in greater detail in @Research-CloudDeployment-HeardIT document, sections - 3.2, 3.3 and 3,5. This document has been updated to reflect the latest developments. This sprint I put significant work into updating the DevOps part of my project and I can say that I achieved a significant and stable automated testing and deployment environment. For these reasons, I grade myself on this learning outcome with **Proficient**.
     + Sprint 2 - This sprint I finalized the set-up of the CICD pipelines for my application services. This means that I have a proper CICD pipeline that can automatically deploy my services to the cloud - Google Cloud. I had to do extensive research into how this can be done and what I had to do in order to achieve these results. this can be seen in @Research-CloudDeployment-HeardIT where I explain what I had to research and complete. Establishing properly my CICD pipeline was a core focus of this sprint and I spent a significant amount of time on it. I am very pleased with the results and I can say that now my CICD pipeline is properly established. Because of these reasons I grade myself with **Proficient**.
     + Sprint 1 - My reasoning for this LO is that I have created the CICD set-up and I already have some tests in place and a part of the deployment. My goal for the first sprint was to have one service of my project working so that I could create the CICD part of the DevOps environment now. However, there is still a lot to do this is why I have decided to put my level on **Beginning** at this point.
5. Cloud Native - **Proficient**
   * What I need to prove? - Creating cloud native software solutions is at the core of modern software development standards. Acquiring knowledge and experience and executing upon it will play an important part of the development process of the applications that I will be working on this semester. Due to the nature of the applications, they will have to be deployed to external cloud platforms. The deployment research and process will be documented and regularly presented to the teachers and stakeholders. The applications working in a real cloud environment using real cloud services as well as the according documentation and infrastructure to support them will be the proof for this learning outcome.
   * Evidence:
     + Individual project: @Project Pitch -HeardIT , @Project Plan - HeardIT , @Research Plan - HeardIT, @User Requirements - HeardIT, @Research-Architecture-HeardIT, @Research-CloudDeployment-HeardIT, @Research-DataDistribution-HeardIT
     + Group project: @Group Project Plan , @Group Project requirements
   * Reasoning:
     + Sprint 5 - During the last sprint of this semester, I continued to update my cloud deployments and to ensure that the new services that were created remain cloud native. All of these new services are implemented with this in mind and have been deployed to the cloud environments successfully. An important new feature that contributes to this learning outcome is the implementation of the database replication which allows my application to be even more suitable for a cloud environment by providing more robustness and increasing the availability of my databases. Another feature that improves my platform's cloud native capabilities is the implementation of message broker that allows for better communication between the services. These new improvements have been explained in detail in the @Research-DataDistribution-HeardIT , sections 3.5 and 3.6. During this sprint I had a discussion with all three teachers about my progress and for this learning outcome I was graded with Proficient by them. Developing cloud native applications, and in general working with the cloud was a new topic for me this semester. I believe that I have managed to show that I am capable of understanding and applying the core principles of the cloud native with the application that I developed. However, there are many different sub-topics that are a part of the cloud environment that I would like to learn more about and that I think are important for my future development as a software engineer. Because of these reasons, I grade myself with **Proficient**.
     + Sprint 3 - 4 - During this period I had to do a big re-design of my application. This was mainly because I needed to establish a proper Kubernetes deployment on both my Google Cloud Kubernetes cluster and also on my Fontys NetLab cluster. To do this, I created a new deployment for my services and now all of them are running on the Google Kubernetes Engine cluster. This means that the main challenge for now, which was creating a Kubernetes deployment and deploying it to the Cloud has been completed. This is explained in the @Research-CloudDeployment-HeardIT document, sections 3.1, 3.3 and 3.4. Another new feature that contributes to this learning outcome is the updates to my file storage database system, which is now also a cloud service in the form of Google Cloud Storage. This is made to optimize and increase the efficiency of my song playing service which is now both more scalable and more robust. I also use a similar type of cloud storage provider for my user data in the form of Auth0's services. For more information about the cloud storage that has been implemented, refer to @Research-DataDistribution-HeardIT . Because this sprint I completed the main cloud related requirements and properly deployed my application to a Kubernetes cluster on the cloud both on Google and on the Fontys NetLab, I grade myself with **Proficient** for this learning outcome.
     + Sprint 2 - This sprint I spent a significant amount of time figuring out how to deploy my application to the cloud. This meant that I had to do extensive research about how to actually deploy my application and what possible cloud providers I could use. This can be see best in my @Research-CloudDeployment-HeardIT, section 3.1 and @Research-Architecture-HeardIT, section 3.4, where I go into detail explaining which cloud service provider I have chosen to use and how can I create my application so that it makes the most of the cloud environment and is a cloud native application. My choice for cloud provider is Google Cloud, since they offer a very nice free package and it was convenient for me to connect it to my CICD pipeline. My application being deployed and functioning properly in the cloud environment was one of my main focus points for this sprint. However, there are still some aspects that I wat to explore mostly related with Kubernetes, which I did not have the time to delve into this sprint and for these reasons I grade myself with **Beginning.**
     + Sprint 1 - I have started reading and doing some initial research on this topic, however, I have not completed any products or documentation specifically related to it at this point.
6. Security by Design - **Proficient**
   * What I need to prove? - Security is a vital part of any modern application that contains data for its users and products. In order for the applications to allow its users to have a pleasant and secure experience while using it, extensive research and development will be conducted. This research will allow me to determine the best practices and methods that I can apply to keep the users privacy and security. Preventing breaches, data leaks and other types of insecurities and possible attack surfaces is from vital importance in the modern software development sphere and as such will play a big part in the development process. As proof for this outcome will be the research documents related with the security aspects, documents detailing how these methods are implemented and what potential threats were detected and prevented.
   * Evidence:
     + Individual project: @Project Pitch -HeardIT , @Project Plan - HeardIT , @Research Plan - HeardIT, @User Requirements - HeardIT, @Research-Architecture-HeardIT, @Research-CloudDeployment-HeardIT, @Research-DataDistribution-HeardIT, @Research-SecurityAndDataProtection-HeardIT, @OWASP Security report - HeardIT
     + Group project: @Group Project Plan , @Group Project requirements, @Ethical design - Short report about Ethical Requirements (Week 8)
   * Reasoning:
     + Sprint 5 - This learning outcome was one of the main focus points for me during the last sprint of this semester. Significant work, both in researching and in implementing was done for this topic. I created the @Research-SecurityAndDataProtection-HeardIT where I focused entirely on how to protect the data that my application uses. I expanded upon the previously created @OWASP Security report - HeardIT by looking into specific issues that my application can be vulnerable to and how to prevent them. I also focused on researching the GDPR. GDPR is a very important set of regulations that need to be implemented and accounted for when creating applications that will be used in the European Union. Since my application is deployed to Europe it is mandatory that it conforms to the regulations. I also spent a significant amount of time researching and implementing safe secure measures that ensures my users' data is protected. User consent is also required so that transparency is always ensured. The data that is collected is only the minimal required and proper mechanisms for data clearing have been implemented. As such, all new features and functionalities have been created with these measures in mind so that my application provides a safe and secure environment for my users. Because of these reasons, I believe that I have achieved a **Proficient** result for this learning outcome.
     + Sprint 3 - 4 - Significant work was done for this learning outcome in several ways. Firstly, the proper implementation of my services to follow the microservice architecture design pattern, means that my application follows the established standards for secure architecture in software development - refer to @Research-Architecture-HeardIT, section 3.5. Secondly, I came to the conclusion that using established cloud storage providers for my song files (Google Cloud Storage) and user data (Auth0) allows me to have a better and more secure data storage since these providers have some of the most secure databases on the market and they guarantee secure data storage - refer to @Research-DataDistribution-HeardIT, sections 3.2 and 3.3. Thirdly, I am now using Auth0 for my user authentication and authorization. Auth0 ensures the secure and safe handling of my private user data, like login credentials and allows for multi-factor authentication. Auth0 also allows for logins using external services like Google, Facebook and others. This means that my user authentication and authorization services are done using modern security measures in compliance with all regulatory conventions. For more detailed information about why I decided to use Auth0, refer to @Research-DataDistribution-HeardIT, section 3.3. Lastly, during this period I also created the @OWASP Security report - HeardIT where are examined my application for the OWASP Top 10 security awareness list and highlighted the measures I have taken in order to protect my data. Because of these reasons, I grade myself with **Proficient**.
     + Sprint 2 - During this sprint, the security topic was explored while doing my @Research-Architecture-HeardIT , @Research-CloudDeployment-HeardIT as well as @Ethical design - Short report about Ethical Requirements (Week 8). This was done since security is a extremely important topic that has to be addressed in every aspect of the application development. I have explained more what goes into designing and creating a secure by design application in the above stated documents. However, I still need to put these findings into proper practice so for this reason I grade myself at **Beginning**.
     + Sprint 1 - I have started reading and doing some initial research on this topic, however, I have not completed any products or documentation specifically related to it at this point.
7. Distributed Data - **Proficient**
   * What I need to prove? - The projects that I am a part of this semester allow its users to have access to a vast amount of data and facilitate a great amount of information. As such, it is expected that both my individual and my group projects will be able to handle and store this data securely but also being easy and fast to access for its users. The best practices in modern development will be researched, applied and the whole process will be documented. Research documents that delve into the different actions needed to facilitate this kind of vast data, documents that detail how the best practices are applied and real implementations will be the proof for this learning outcome.
   * Evidence:
     + Individual project: @Project Pitch -HeardIT , @Project Plan - HeardIT , @Research Plan - HeardIT, @User Requirements - HeardIT, @Research-Architecture-HeardIT, @Research-CloudDeployment-HeardIT, @Research-DataDistribution-HeardIT, @OWASP Security report - HeardIT
     + Group project: @Group Project Plan , @Group Project requirements, @Ethical design - Short report about Ethical Requirements (Week 8)
   * Reasoning:
     + Sprint 5 - This learning outcome was one of the main focus points for me during the last sprint of this semester. Significant work, both in researching and in implementing was done for this topic. My previous database set-up could be improved to become even more robust and reliable. To do this, I implemented database replication. Database replication allows databases to asynchronously keep the data between them synchronized and allows for a better distribution of data. It allows my services to be even more independent and be more reliable by spreading the data over several servers, allowing for better scalability and higher up times. I have explained in greater detail what database replication is, how it works and how it benefits my application in the @Research-DataDistribution-HeardIT , sections 3.4 and 3.5. Another part contributing to this learning outcome is the research and implementation that was put into the message broker that I integrated into my application. Through the use of a message broker, services can communicate between each-other reliably, asynchronously and can exchange data whenever needed. This is a very important part of this learning outcome, since it provides the necessary connections between the different types of data that are being handled in my application. The details about the message broker and its application are explained in more detail in the @Research-DataDistribution-HeardIT , section 3.6. All of these improvements have been implemented so that my platform is even more robust and reliable. With these updates I believe that I show that I understand and I am capable of implementing complex mechanisms for data distribution into a real scenario. For these reasons, I grade myself with **Proficient**.
     + Sprint 3 - 4 - During this period I spent a significant amount on time establishing a proper data storage that will allow me to have reliable and well performing services. This was done in mainly three focus areas: the storage of my song files, which is the main challenge when working with such kinds of data due to the sheer size and amount of information, the user data, since it must be stored and handled securely and must be protected from outside interference, and lastly the rest of the data that my application is working with. For my songs, I have a file storage system in the form of Google Cloud Storage, which allows me to store the song files and have fast, reliable and also secure access to them, and also MySQL databases that keep all of the extra metadata for my songs. For my users, I decided that using the services of Auth0 for user data storage makes my application more robust and also more secure from attackers. This is all outlined and expanded upon in my @Research-DataDistribution-HeardIT, where I explain in great detail why I have made these decisions and how they impacted my project. Because with these steps, I believe that I have achieved the main requirements for this learning outcome and I grade myself with **Proficient**.
     + Sprint 2 - The topic of data distribution, data storing and data collection was explored while doing the @Research-Architecture-HeardIT , the @Research-CloudDeployment-HeardIT and the @Ethical design - Short report about Ethical Requirements (Week 8) since these researches require determining what kind of data I am working with as well as how this data is stored, used and protected. I gathered a lot of valuable information about how to better work with the application data and in the next sprints I am going to expand upon this topic. For this reason I grade myself with **Beginning**.
     + Sprint 1 - I have started reading and doing some initial research on this topic, however, I have not completed any products or documentation specifically related to it at this point.

# General reflections

In this section I will explain my general reflections on the process and the projects. I will give my insights into the development stage, how far I have progressed and what needs to be done next. This section will be split into **Sprints** so that my progress can be observed easily.

## Sprint 5

**Individual project**

Current state: The sprint was the final sprint of this semester and during it I had to do several tasks in order to finish my project. At the beginning of the sprint, I had a discussion with my teachers about my current progress. The general feedback was that I was on track, however, there were some specific topics that I had to focus on in order to achieve the required proficient results for this semester. I mainly focused on the security and data distribution topics. For the security, I was curious about specific issues that my application could be vulnerable to and I spent a significant amount of time looking into how to prevent them. I also spent a significant amount of time on researching and implementing features that would make my application GDPR compliant. The GDPR set of measures are a crucial part of software development since violations of them can lead to legal consequences. As such, I wanted to make sure that my application abides by the GDPR. Apart from looking into security measures, my other main focus point was the proper distribution and handling of the data. I had a potential bottle-neck that could cause problems in my application if left unaddressed. This is why I researched and implemented database replication. With database replication my services are now more robust, more independent from each other and can be scaled better under high loads. Finding out how to do database replication and then actually implementing it took a significant amount of time but I learned many new things and I feel I got much better at the technologies that I was using. Another part of the data distribution that I had to work on was how to allow my services to communicate between each other. This is where the implementation of the message broker comes in. Since I had no prior experience with using one, I had to do research into how to use and how to implement a message broker, that would be beneficial for my application. This was a very interesting process that allowed me to think outside of the box so that I could improve my application's reliability and robustness. Apart from these topics, as this was the final sprint, I had to finalize all parts of the project and I had to update all parts of the documentation and finalize the researches. In my opinion, this was a very good final sprint since it allowed me to not only wrap up and complete the project but also learn many new interesting things and show that I understand them in real scenarios. With this, I believe that I have proven that I have met the required level for all of the learning outcomes for this semester.

Final steps: The final steps are to present my project before the teachers and get my evaluation for this semester.

**Group project**

Current state: This sprint was one of the busiest for the group project. During this period, I had one of the main tasks, that being creating the generation of the YAML files. This was one of the most important parts of this project, which meant that I had a significant amount of pressure on me to complete my tasks. For a part of this sprint, I was also Scrum master, which further increased my work load. However, this was a great opportunity for me to show my skills both in developing but also in the team management. In in the end, I managed to complete my tasks and create the YAML generation to a proper level. A little bit before the beginning of the sprint, one of our team members decided to drop out and we were left 4 people to complete the project. On top of that, since this was the last sprint of the semester, everyone was mainly focusing on their individual projects. Despite that, everyone did their best and showed professionalism and in the end the team managed to finish the project. In my opinion, this was the most productive sprint so far and I am glad that we managed to complete out project successfully.

Final steps: The final steps are to present the project to our stakeholders and deliver it, with the proper handover documentation needed for the people who are going to pick it up after us. We are also going to present it at the Innovations Insight event.

## Sprint 3 - 4

**Individual project**

Current state: The period including sprint 3 and the half of sprint 4 was a very important stage of my project development since it included an almost complete re-design of the application structure and services architecture. I properly implemented the microservices architecture design pattern to my project. New features and services were added, my song streaming was improved and updated, user authentication and authorization was also implemented. I spent a significant amount of time working on properly establishing my databases and file storage systems, while also ensuring that my application is safe and properly secure. Once I had done the re-design and had implemented the new features, I worked on creating a proper Kubernetes deployment to both Google Cloud and also to the Fontys NetLab servers. This was done since now that I had the proper service architecture, I could establish my Kubernetes clusters and also create the proper deployments. These deployments are done through my CICD pipeline, which also had to be updated to accommodate the new application services changes. On the Fontys NetLab, I created the deployment in order to have proper load testing of my application. This is also implemented in my CICD pipeline so that the load testing can be performed automatically. The deployment process took a very significant amount of time since there are a lot of things that I had to learn and find solutions to. For more detailed information about each of these topics, refer to the Learning Outcomes section in the portfolio. Overall, this was one of the most productive periods of my project development so far, since I had to do a lot of tasks in the time span. I can say that I am very pleased with the results, since I believe that I have completed the requirements to achieve the learning outcomes to the required level.

Next steps: The next steps are to implement more features and polish previous ones while also working on improving my application. Now that I have my proper architecture, CICD and testing environment properly set up, I can safely start adding more features that will allow my application to expand and improve.

**Group project**

Current state: The group project is going relatively smoothly so far. During this period, I focused mainly on creating unit tests for the back-end of the application. This was a very interesting process where I learned how to do unit testing in Go which was a new topic for me. After I was done with doing the tests, me and my colleagues started designing the logic behind the structuring and generating of the YAML files for the Kubernetes deployments. So far, we have created a new front-end which incorporates the new ideas and improvements that we have had. We also have presented these new ideas and improvements to the stakeholders and they were very pleased with our progress. Overall, a great sprint where I was able to learn how to do Go unit tests and also I took a significant part of establishing the YAML file generation brainstorming that we had.

Next steps: The next steps that I am going to focus on is actually implementing this new brainstormed logic for the structuring and the generation of the Kubernetes YAML files. This is one of the main goas of the group project and I am very interested in working on it. The whole team is committed to delivering great results for our group project.

## Sprint 2

**Individual project**

Current state: During sprint 2 I spent the majority of my time into deploying the application to the cloud. I wanted to finalize the CICD pipeline set-up so that I would have the building, testing and deploying process automated. This will allow me to implement the next features of my project faster and more efficiently. Deploying it to the cloud also means that I have managed to stabilize it and I have laid the grounds for the next developments to make my application cloud native. So far my application consists of two main services - the front-end service which asks for a specific song and the back-end service which has some initial functionality that can stream one track to the front-end service. This is all working now on the cloud. For more information about the research and development that was put into implementing this, please refer to the @Research-CloudDeployment-HeardIT and the GitHub repositories: Back-end services and documentation: <https://github.com/Jumorto/HeardIT>; Front-end: <https://github.com/Jumorto/HeardIT-FrontEnd> . I also spent a significant amount of recourses into establishing and creating my architecture research document @Research-Architecture-HeardIT . This was done since I wanted to establish my architecture design so that I could build upon it in the next sprint. Overall, this sprint was very productive and I am very pleased with the results.

Next steps: The next steps that I want to focus on is applying the architecture research to my application and building upon it. I want to polish my existing features and implement new ones if possible. One important thing that I need to look into is the load testing. I want to research how to can I do it and what tools I can use in order to evaluate the performance of my application under heavy usage. This will allow me to find new points to improve my application in many aspects such as the architecture and other possible features that might cause a bottle-neck or some other unexpected failure. To improve upon the learning outcomes I will also continue working on documenting my work and providing evidence for each of them.

**Group project**

Current state: The group project is going relatively smoothly so far. During this sprint I had to deal with quite a complicated issue that was preventing us from accessing the repositories that we use to store the source code of the application. However, after a significant amount of experimenting, reading information online and testing I was able to fix the issue and now we can access our repositories. I also spent a lot of time understanding the way the application works and I participated in all of the meetings we had with both our stakeholders and with my team. The stakeholders provided us with very useful information that me and my team are going to take into account when developing our group project. One of the bigger changes this sprint was the we moved to GitHub since it will allow us to have a more professional and better CICD pipeline. This change was also needed since the issue which I was working on was blocked by a problem with the configurations of the Fontys GitLab. Overall, a great sprint where I was able to fix an important issue and get great insight into the application that me and my team are working on.

Next steps: The next steps that I want to focus on is testing the existing functionality that we have. We want to make sure that everything that has been implemented so far works as intended. This means that this sprint I will be mainly focusing on unit testing our specs library and determining if everything there is working properly. As a team we came to the conclusion that once we are done with the testing we will be confident to start adding new features.

## Sprint 1

**Individual project**

Current state: My current progress of my personal project so far is that I have one of my services created and it is tested. I have established the main architecture approach and the main structuring of the project has been done so far. I also have a CICD pipeline that can build, test and create a docker image of my application. I have also created the Project Pitch, Project Plan, Research Plan and User requirements. Establishing the structuring of the documentation such as this reading guide of my portfolio has also been a big part of my personal work so far.

Next steps: The next steps that I want to focus on are mainly to do with creating the first needed researches and adding more to the current HeardIT application. I want to properly establish the needed databases, services and other back-end related activities, some improvements to the front-end and finishing the CD part of my pipeline.

**Group project**

Current state: My current progress of the group project has been mostly related to establishing the initial requirements and exploration activities. I have been involved into creating the Project Plan, establishing the user requirements, communicating with the stakeholders, establishing the tools that my team uses such as Jira, Teams Chat and so on. I have been a part of the creation and presentation of the sprint review and project introductions that we have done so far. I have also been learning how to use Golang and I have spent a significant amount of time getting to understand the handover project that was given to us.

Next steps: The next steps that I want to focus on about the group project is creating the generation of the Kubernetes YAML files since this will be a major part of the project. In terms of communication I believe that proper interactions between team members and the team and the stakeholders takes time so I will be spending some time getting to know my team better and improving both the internal and external communications.

# Conclusion

To conclude my portfolio reading guide, I have established the main structure of it and the main sections that will be a part of it. During the semester this portfolio will be continuously updated so that it reflects the current status of my projects and my progress related to the learning outcomes.