

# IT UNIVERSITY OF COPENHAGEN

## Project *Chirp!* Web Application

Course code	BSANDSA1KU
Name of course	Analysis, Design and Software Architecture
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Project title	<i>Chirp!</i> Web App
Group number	17
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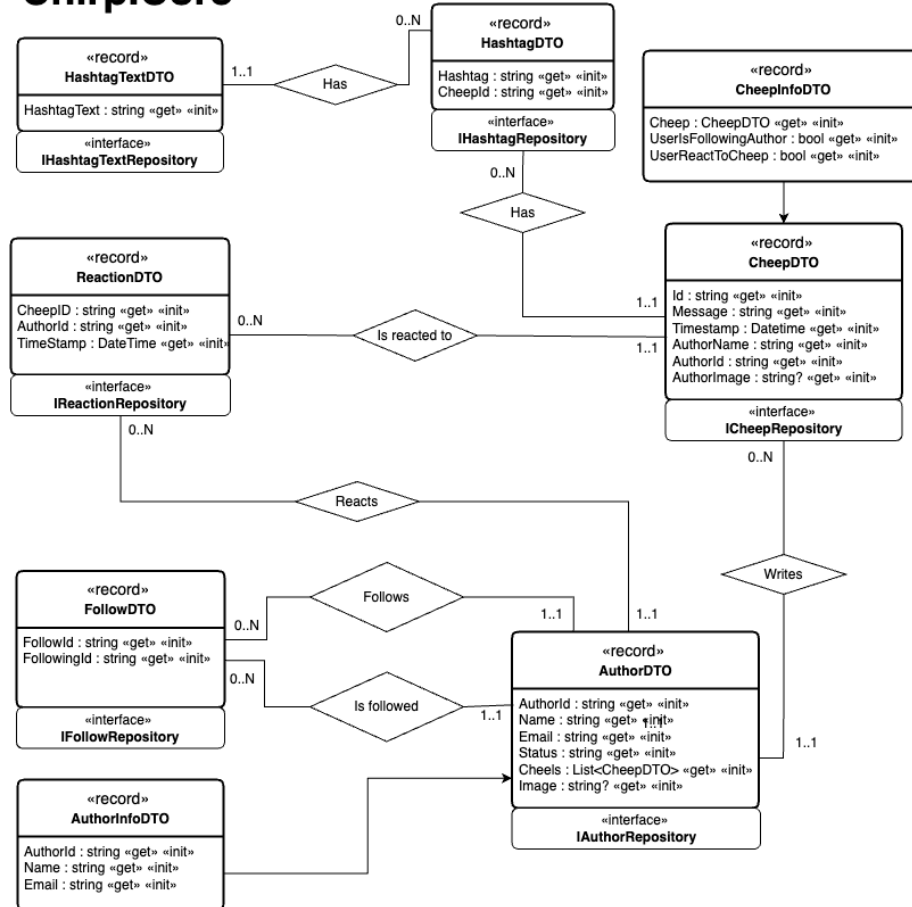
## Design and architecture

### Domain model

The domain model reflects the entities and their relationship of the Chirp application, as well as the interfaces of the repositories that allow for accessing and manipulating these different entities and their related data. These entities form the foundation of the business logic of the application.

The diagram below shows the domain model of the Chirp application.

## Chirp.Core



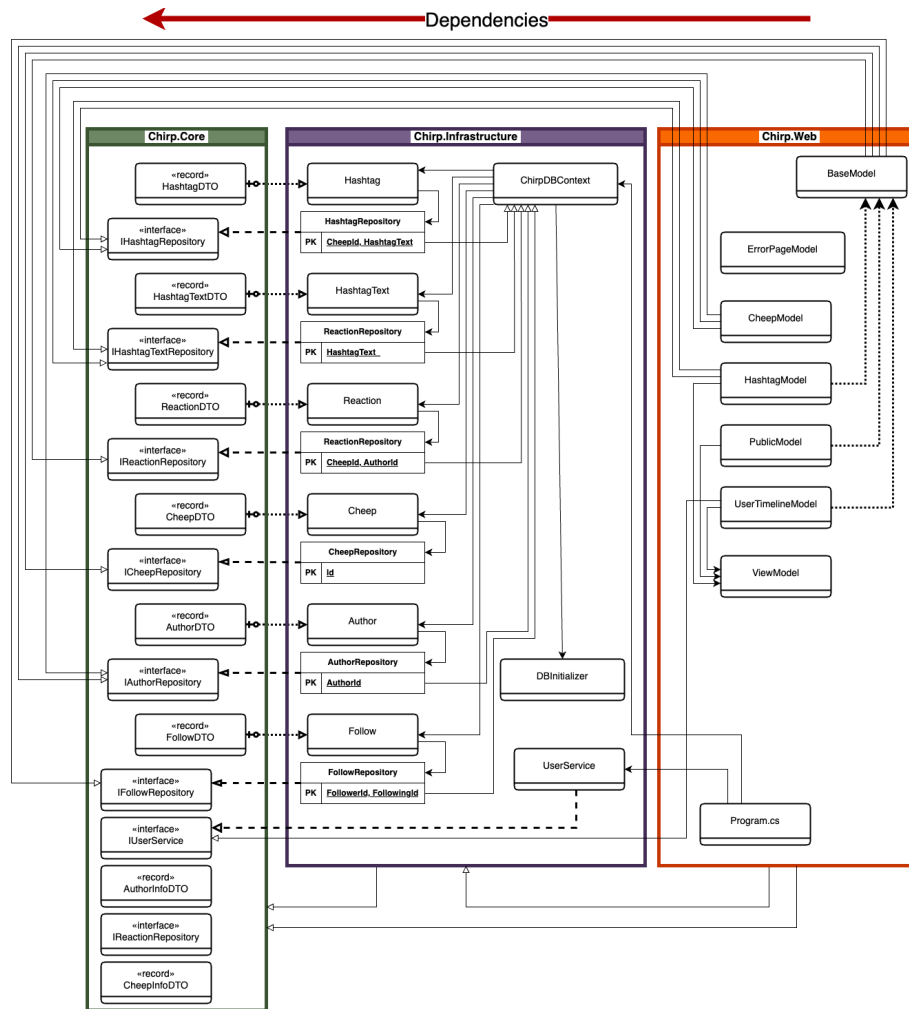
### Architecture — In the small

The application Chirp has been designed with Onion architecture in mind.

The diagram below shows the organization of the code of the Chirp application, showcasing the relationships and dependencies of different components of the program, highlighting how the code of the program is organised into different layers of the onion architecture design.

The diagram shows the inward flow of dependencies in accordance with Onion architecture, so that the inner layers remain independent of external dependencies.

Some relationships have been omitted to improve the readability of the diagram.



The figure below shows a more simplistic view of the onion architecture structure of the components of the application.

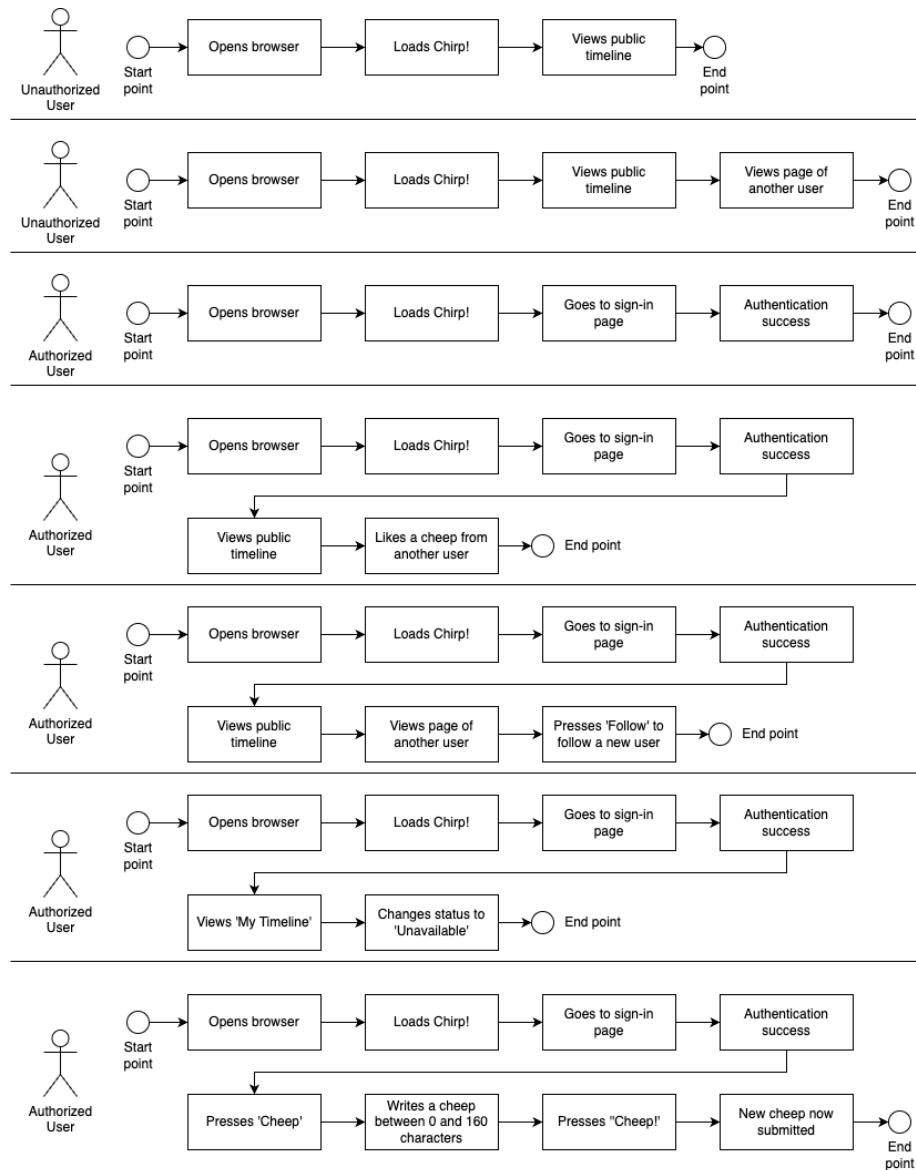
### Architecture of deployed application

The Chirp application is deployed on Microsoft Azure, utilizing Azure services with an Azure SQL database.

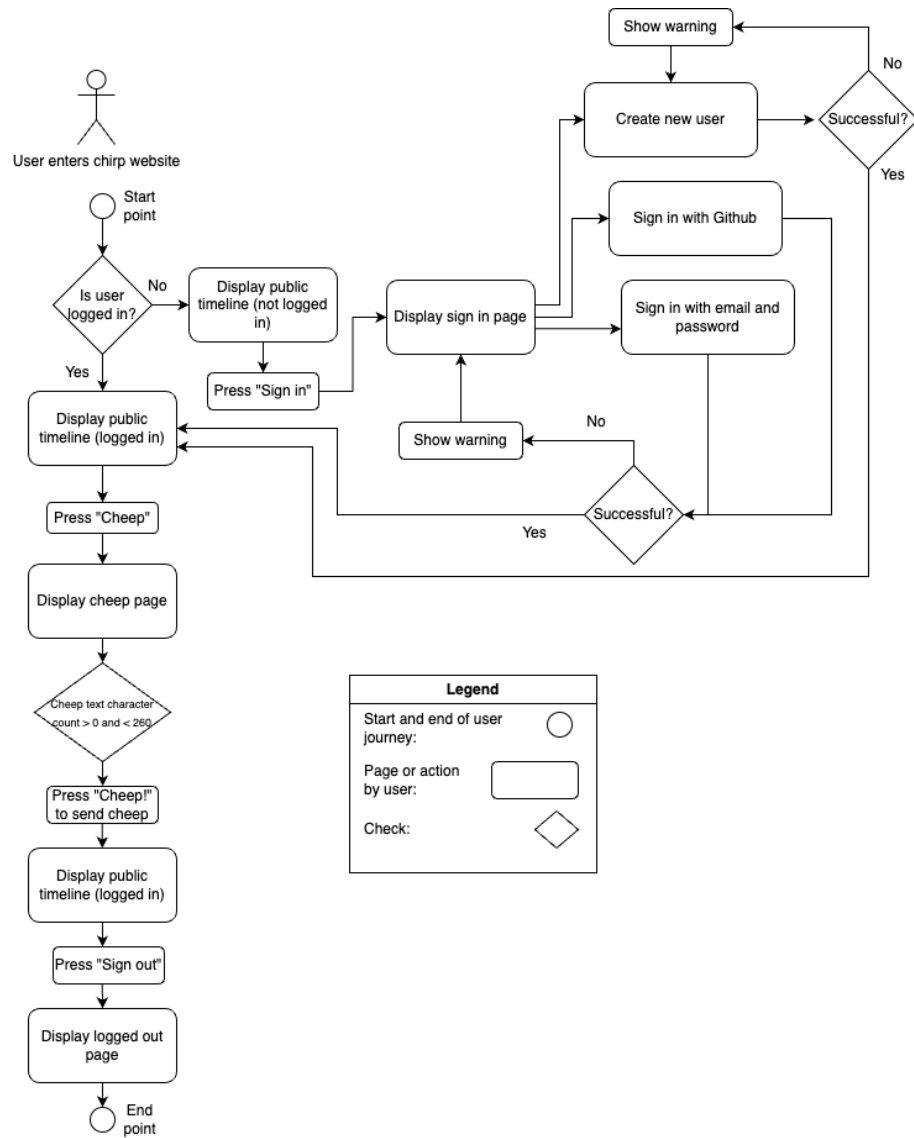
The diagram below shows the interaction between the client component with a user interface allowing the user to make requests and the application deployed on Microsoft Azure as the server component. The diagram also shows the interaction of this deployed application with the Azure SQL Database, as well as signing in through a social account (GitHub).

## User activities

The diagram below shows a series of typical user activities through the Chirp application while remaining unauthorized and after logging in and becoming authorized.



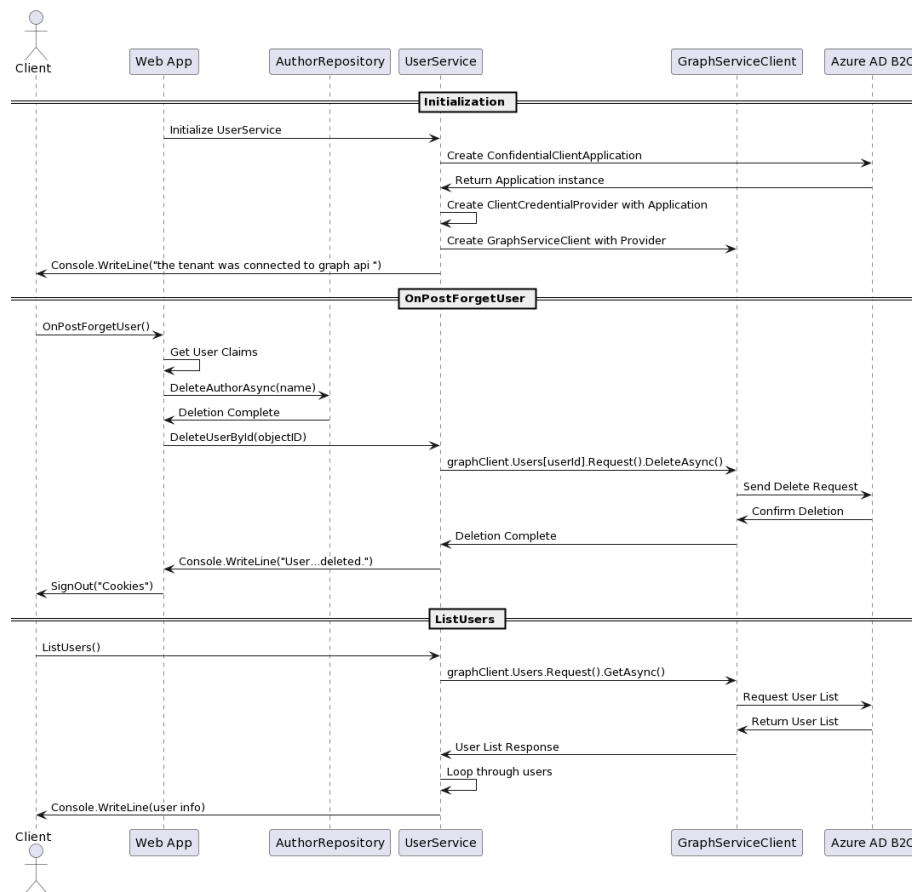
The diagram below shows a slightly more detailed view of possible scenarios of a user journey, in which a user enters the chirp website, logs in or creates a profile if necessary, sends a cheep, and then logs out.



### Sequence of functionality/calls through *Chirp!*

The diagrams below illustrates the flow of messages and data through the Chirp application.

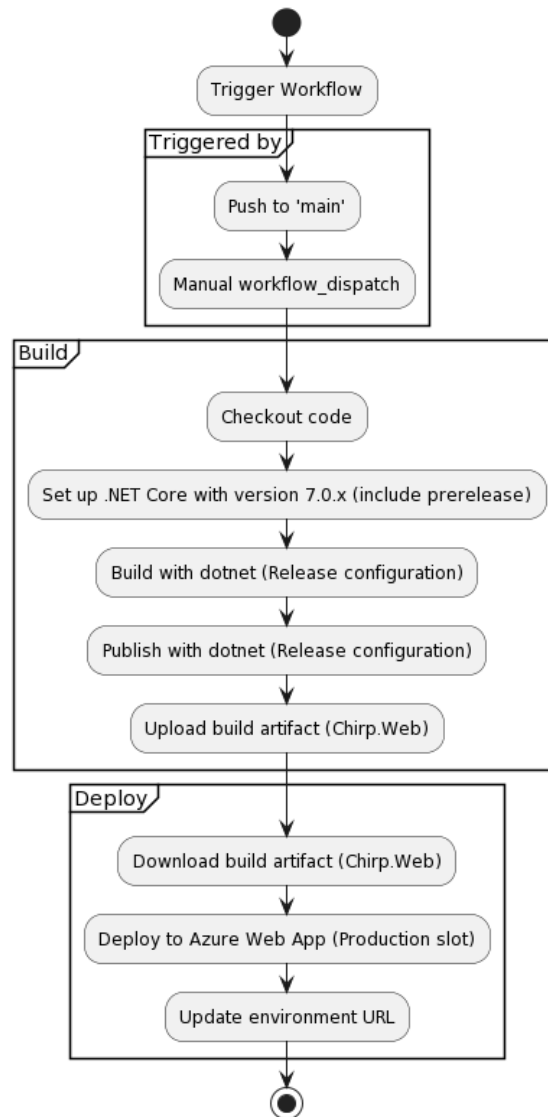




## Process

### Build, test, release, and deployment

#### Build and deploy ASP.Net Core app to an Azure Web App - BDSAGROUP-17



This workflow is the deploy workflow for azure

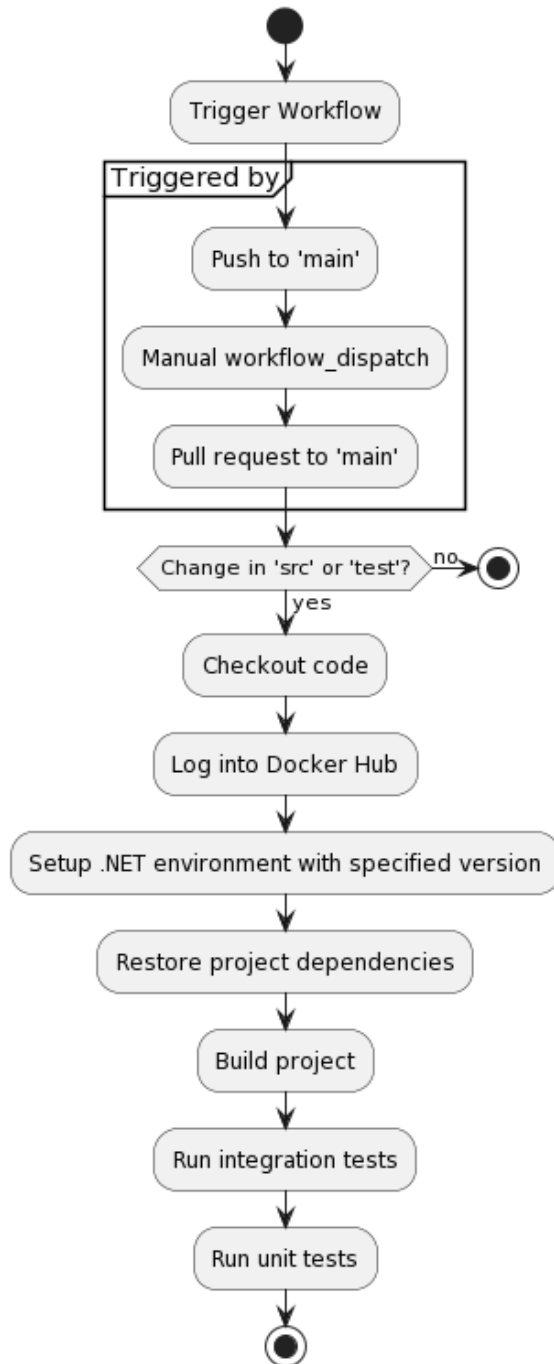
1. The User triggers the workflow on **main** branch or manually dispatching the workflow .
2. The GitHub repository then triggers the **build** job on the GitHub Actions



Runner dedicated to building the app.

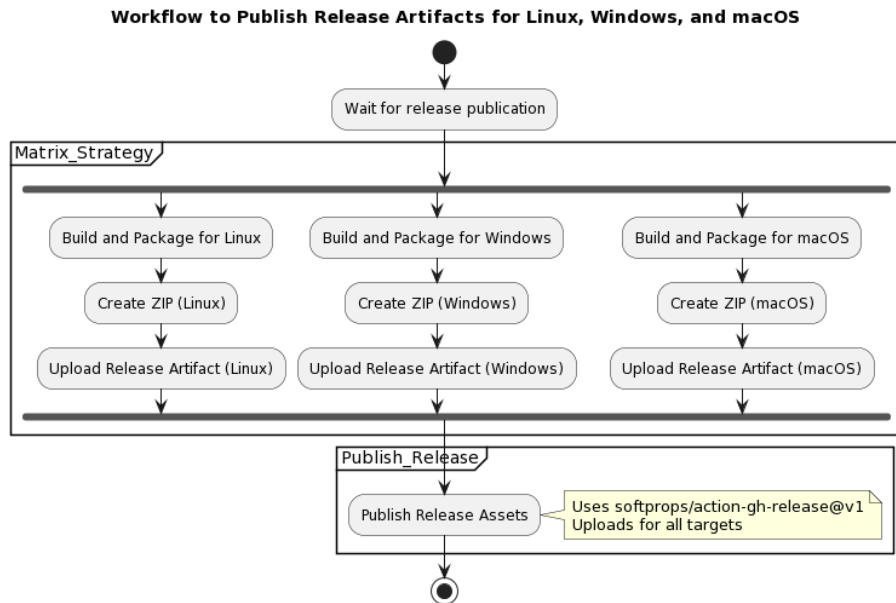
3. The build runner performs the following steps:
  - Checks out the repository.
  - Sets up .NET Core SDK version 7.0.x with prerelease versions included.
  - Builds the ASP.NET Core app from the specified source directory with the Release configuration.
  - Publishes the app to the output directory.
  - Uploads the build artifact (Chirp.Web) to GitHub's artifact storage.
4. Once the build job is complete, the repository triggers the **deploy** job on another GitHub Actions Runner.
5. The deployment runner downloads the artifact from the storage.
6. Finally, deployment runner deploys the downloaded artifact to the specified Azure Web App using the given publish profile.

## .NET Build and Test Workflow



This workflow is build

1. This workflow is triggered in the same way as the deploy flow, but the build and test flow is also triggered when there is a pull request to `main`
2. The workflow then checks if there was a change to `src` or `test` if no then it stops
3. The build runner performs the following steps:
  - Checks out the repository.
  - Then workflow logs into Docker Hub
  - Sets up .NET Core SDK with the given version
  - restores project dependences
  - Builds the project without restoring dependencies again.
  - Runs the Integration tests.
  - Runs the unit tests



This is release workflow

- The workflow is triggered when a release is published.
- The `Matrix_Strategy`
  - For Linux, the workflow builds and packages the application, creates a ZIP file, and uploads the artifact.
  - For Windows, the workflow repeats the same steps but tailored for the Windows target.
  - For macOS, the workflow performs the steps for the macOS target.
- After the artifacts for all three targets are prepared and uploaded, the `Publish_Release` partition publishes the release assets using the `softprops/action-gh-release@v1` action. This step uses the uploaded

artifacts for each target as part of the release.

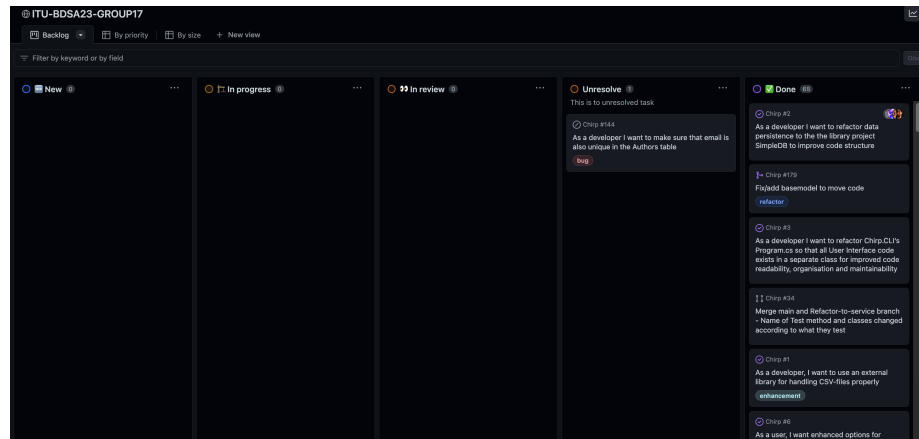
- The process ends after the release assets are published.

## Team work

Overall, we managed to complete all the features we wanted for the application. These include all the features specified by the requirements of the project and some extra features, such as some UI changes and hashtags.

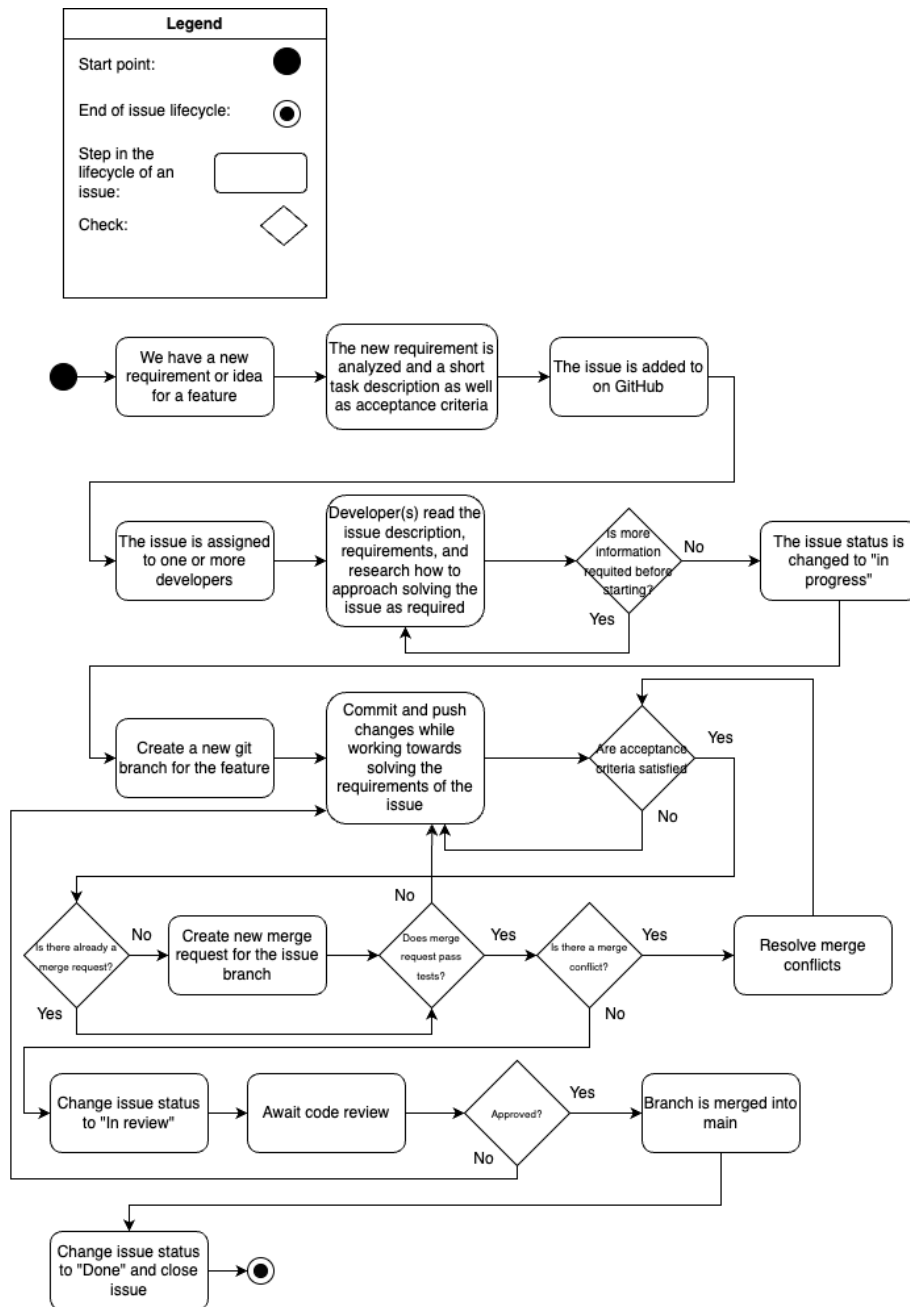
We have one unresolved task in our project board: To make the email unique in the the Authors table, since there was a possibility that an Author could appear twice or more in the table with same name and email but with different id. The reason we did not resolve it is the low priority.

The image below shows the project board just before hand-in, with the remaining unresolved issue.



There are of course many more features we could have implemented given time. Some ideas, which were discussed during development but not prioritized include the ability to comment on a cheep and sharing a cheep to name a few.

The diagram below shows the lifecycle of a GitHub issue from it's creating until it is closed and resolved.



## How to make *Chirp!* work locally

### Run locally

In order to run the application locally, you can either 1. Clone this repository 2. Run the release version

**Clone the repository** In order to run the application locally by cloning the repository, please do as follows:

Clone the repository using this git command:

```
git clone https://github.com/ITU-BDSA23-GROUP17/Chirp.git
```

Change directory into

```
cd "src/Chirp.Web"
```

Inside the directory, run one of the following commands:

```
dotnet watch --clientsecret [your-secret]
```

```
dotnet run --clientsecret [your-secret]
```

You should now have access to a localhost with a specific port, in which this web-app can be accessed

**Run the release** In order to run the release versions, please do as follows:

On the main page of this repository, click on the ***Releases*** section There will be a few assets available (including source code), but only one of the following three will be relevant for us:

- Chirp-win-x64.zip, for Windows users
- Chirp-osx-x64.zip, for Mac users
- Chirp-linux-x64.zip, for Linux users

Please install and unzip one of the three folders, depending on your operating system Now, there should be the following application available in the extracted folder:

- Chirp.Web.exe for Windows users
- Chirp.Web for Mac and Linux users

Now, you have an runnable (as described in step 4). Depending on your operating system, you can run the web-app as follows:

```
Run the following commands: bash      dotnet dev-certs https -t bash
./Chirp.Web --urls="https://localhost:7102;http://localhost:5273"
--clientsecret [your-secret]
```

Upon running the application, a terminal will pop up, indicating in which port (in the localhost) the web-app is up and running

## How to run test suite locally

In the root folder run this command to test all the test

```
dotnet test
```

Make sure you have docker running in your machine

The following test have been implemented

**Unit test** The unit tests are designed to test each individual component of our application by itself.

We have designed a series of unit tests to verify that our DTOs correctly encapsulate data. These tests confirm that each DTO retains and accurately represents the data passed to its constructor.

To run only the unit tests, use the following command in the root folder of the project:

```
dotnet test --filter Category=Unit
```

**Integration test** The integration tests are designed to test how different parts of the application interacts with eachother. These tests involves instances of the database containers and checks if the application does the CRUD operations as expected.

The integration tests test that the repositories classes are able to correctly recieve and modify the relevant data in the database.

Before running integration tests, make sure Docker is running as the tests rely on `Testcontainers.MsSql` to create a containerized MS SQL Server instance.

To run only the integration tests, use the following command in the root folder of the project:

```
dotnet test --filter Category=Integration
```

**End to end test** The playwright can be going into the folder in which the test is saved:

```
cd test\Chirp.Web.Test\Playwright.Test\PlaywrightTests
```

And then run the build command

```
dotnet build
```

After this you need to install the browser:

```
pwsh bin/Debug/net7.0/playwright.ps1 install
```

If you are on Linux or do not have Powershell you can use <https://nodejs.org/en>

Refer to the given link for installation guide <https://docs.npmjs.com/downloading-and-installing-node-js-and-npm>

Then run

```
npx playwright install --with-deps
```

Then in the project you can run:

```
dotnet test
```

Which should start the test

## **Ethics**

### **License**

We chose to use the MIT license for our Chirp application, since it allows other developers to distribute, use and copy our software without imposing significant restrictions.

### **LLMs, ChatGPT, CoPilot, and others**

Utilizing Large Language Models (LLMs), particularly ChatGPT, has proven advantageous for gaining a basic understanding of frameworks like Entity Framework Core, Docker, and Onion architecture through direct questioning. However, reliance on LLMs for information poses a challenge, as the responses must be approached with skepticism, often necessitating validation from more reliable sources. Employing LLMs in code generation has been helpful for explaining errors and facilitating the debugging process, but the generated code is frequently flawed, requiring additional effort in rectification. While GitHub Co-pilot aids in autocomplete and simple repetitive tasks, it may not be as effective for comprehending core concepts, making LLMs a valuable yet limited addition to a developer's toolbox.