Chirp! Project Report

ITU BDSA 2023 Group 13

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1 Design and Architecture of *Chirp!*

1.1 Domain model

The following entity-relation-diagram illustrates *Chirp!*'s domain model.

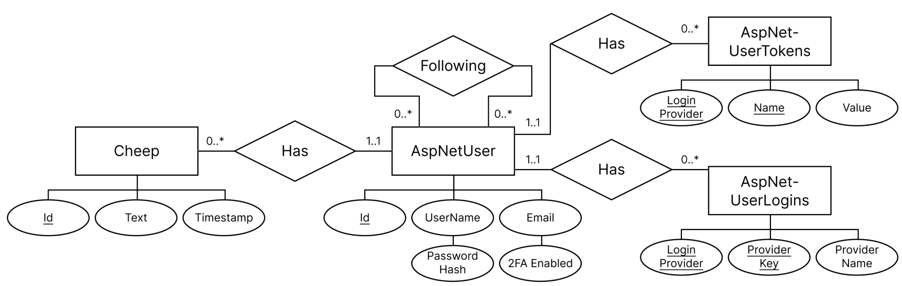


Figure 1: Data model as an ER-diagram.

Each Cheep stores its id, some text, a timestamp that denotes when it was posted, and its author's id.

Each Author (AspNetUser) stores their id, username, email, password hash, whether they have two-factor-authentication enables, aswell the above mentioned. Author's can also follow each other in a many-to-many relation.

The AspNetUser, AspNetUserTokens, and AspNetUserLogins comes from ASP.NET Core Identity that *Chirp!* uses to manage its users (i.e. Authors). In reality, each AspNetUser also stores additional attributes that are not used directly by *Chirp!*. These are normalized username and email, concurrency and security stamps (used for e.g. password-resetting), phone number (*Chirp!* doesn't collect phone numbers), lockout information, and an access failure count. The AspNetUserTokens stores tokens such as two-factor-authentication keys and recovery codes, and AspNetUserLogins stores third-party login provider information, e.g. Github OAuth.

1.2 Architecture — In the small

The following diagram illustrates *Chirp!* overall architecture.

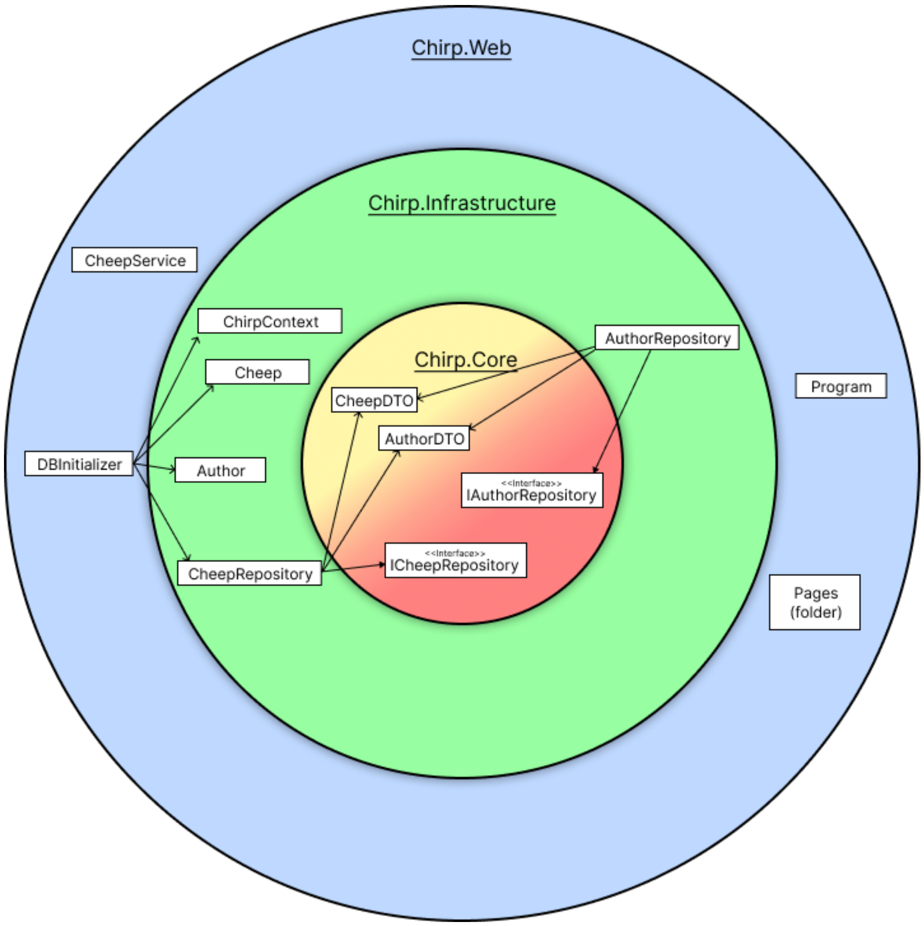


Figure 2: Onion architecture as a diagram.

Each layer only depends on the layer it encapsulates, i.e. Chirp.Infrastructure depends on Chirp.Core but not Chirp.Web.

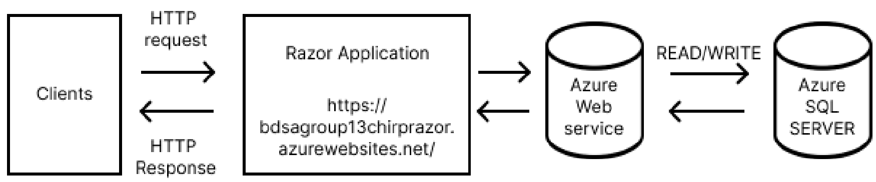
The layer Chirp.Core contains interfaces, in yellow, and DTOs, in red. The interfaces describe the communication between the database and the application. The DTOs (data transfer models) are objects that are used to send data between the layers and consists of a common set data that is used by both Chirp.Web and Chirp.Infrastructure.

The layer Chirp.Infrastructure implements the interfaces from Chirp.Core. *Chirp!* uses Entity Framework Core to manage writing the queries for the database, which helps keep Chirp.Infrastructure database agnostic. It also describes how the database should be modeled.

The layer Chirp.Web handles connecting to the database, reacts to requests, and displays the web pages. Chirp.Web uses Chirp.Infrastructure through the interfaces and DTOs from Chirp.Core. *Chirp!* uses ASP.NET Core Razor Pages to help create the web application.

1.3 Architecture of deployed application

The following diagram shows the architecture of the deployed application.



Chirp! is a client-server application. *Chirp!* is deployed to Azure as a web app, which is also connected to an Azure database.

1.4 User activities

The following diagrams illustrates how a user might navigate around and use *Chirp!*.

1.4.1 Register and Cheep

Here a new user visits *Chirp!* for the first time and wants to register as an author. The diagram shows which pages and actions the user needs to navigate through to achieve this.

1.4.2 Follow and Unfollow

Here an already logged in user visits *Chirp!* to follow and unfollow another author. The diagram shows how a user might follow an author and see how their followed timeline and about me page changes.

1.4.3 Personal Data and Deletion

Here an already logged in user visits *Chirp!* to check what data the *Chirp!* stores of them, and wants to delete their account. The diagrams shows how the about me page leads to the manage account page where personal data is shown. From there, it is also possible to delete your account.

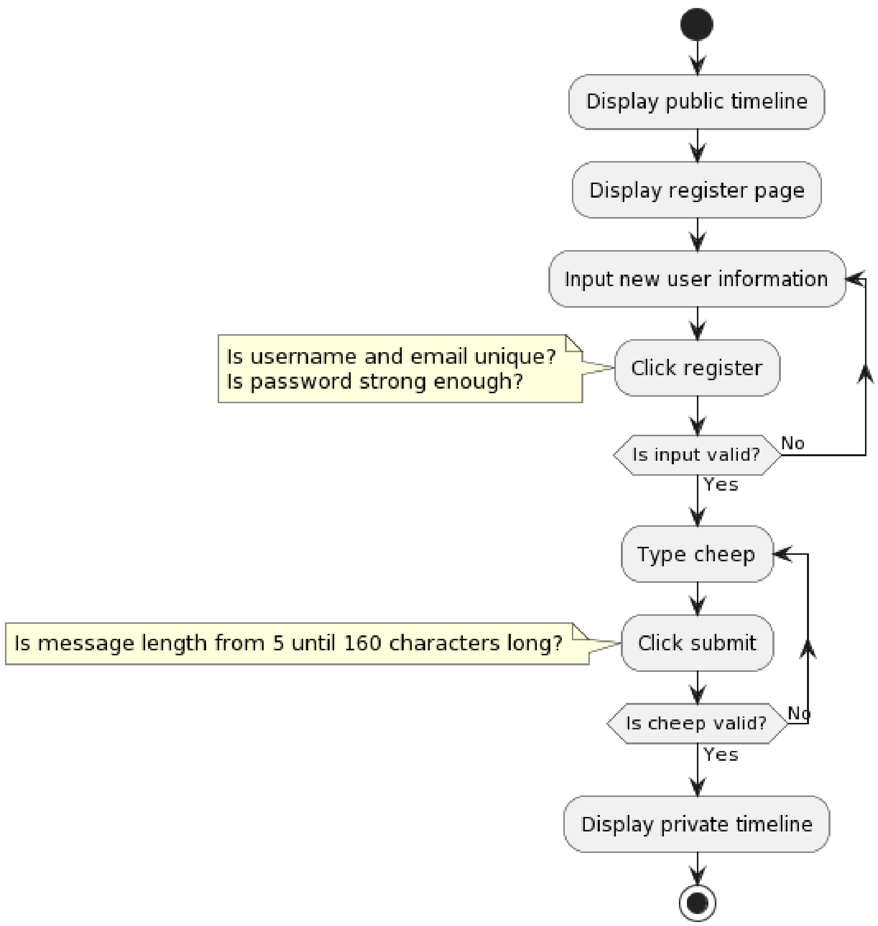


Figure 3: New user registers and submits a cheep.

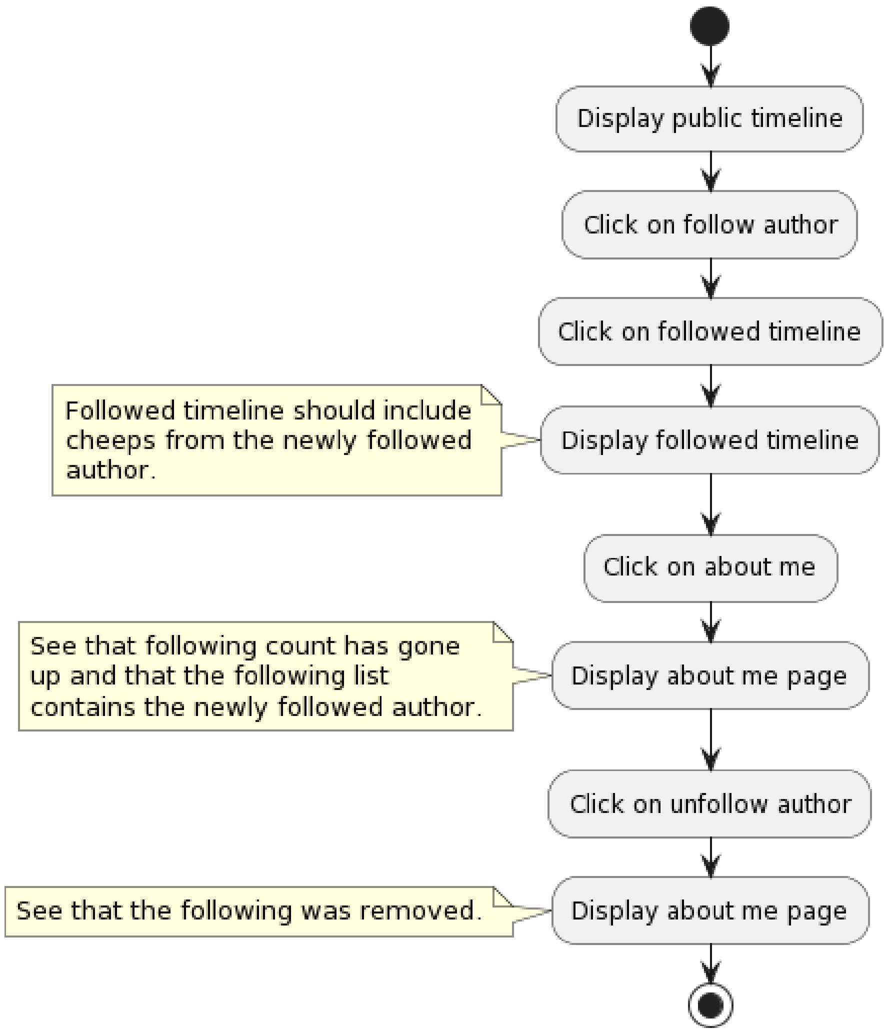


Figure 4: User follows and unfollows an author.

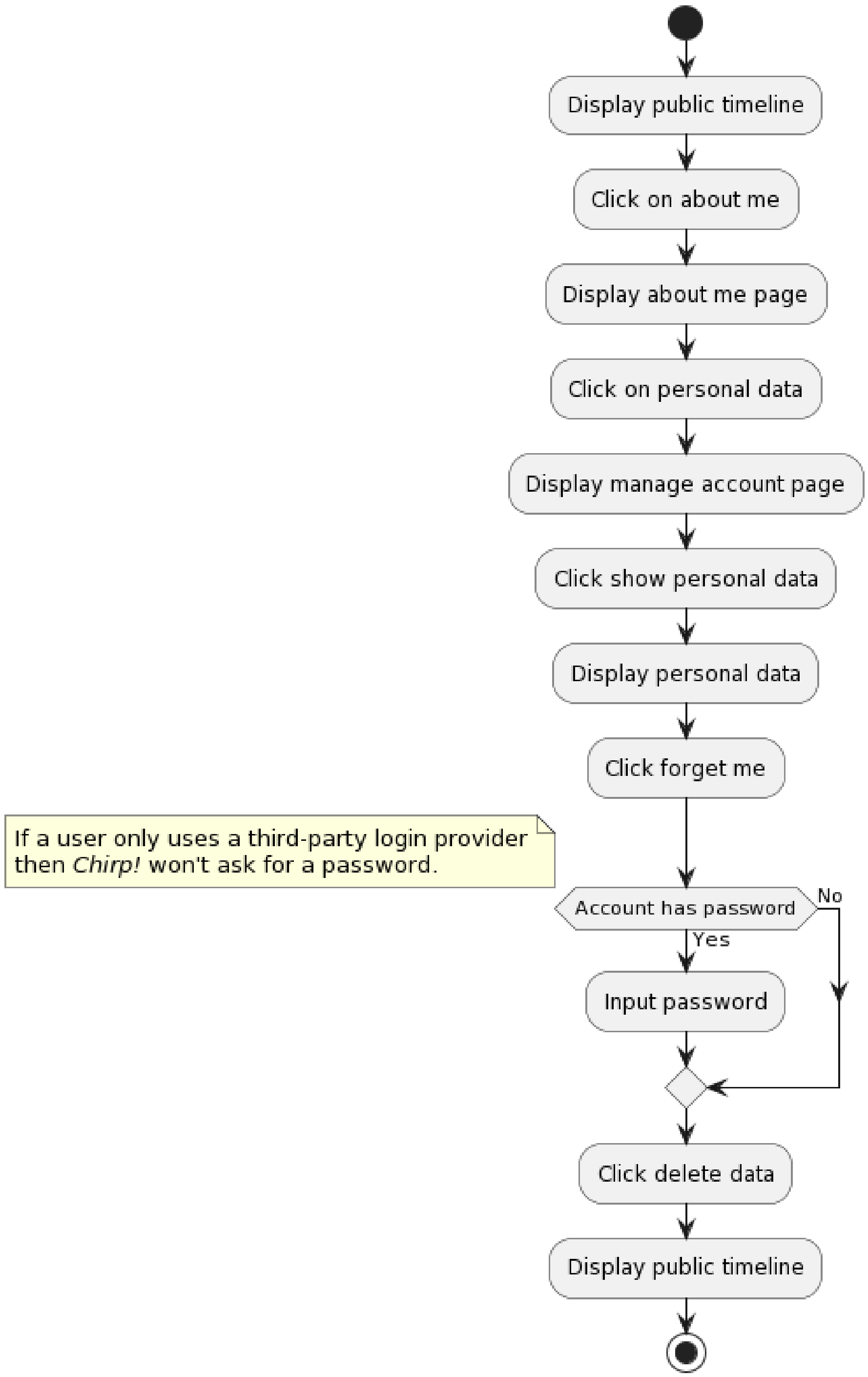


Figure 5: User checks their personal data and deletes their account.

1.5 Sequence of functionality/calls trough *Chirp!*

The diagram below shows the first sequence diagram.

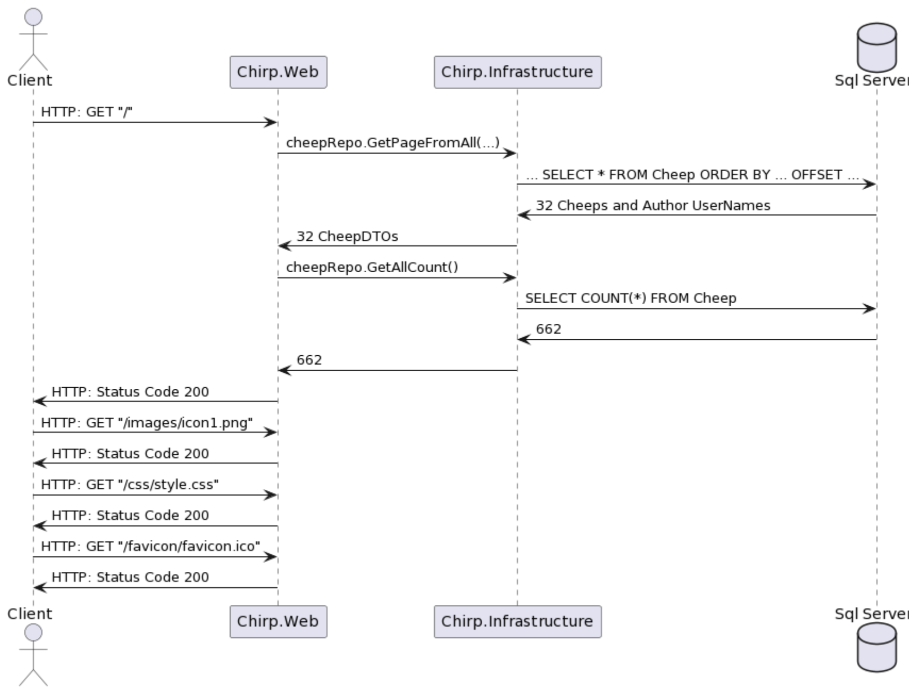


Figure 6: Client visiting "/" as a Sequence Diagram.

This sequence diagram shows the network traffic of a user requesting the homepage of our Chirp application as well as which database queries are made.

This sequence diagram shows the network traffic of an already logged in user requesting the about me page.

This sequence diagram shows the network traffic of a not logged in user attempting to register with GitHub. (The stylesheet and favicon requests have been omitted.) We don't know much about the requests sent between GitHub as well as the database in this case, because it is handled by ASP.NET Core Identity, and is not written by us.

2 Process

2.1 Build, test, release, and deployment

We use GitHub Actions to manage releasing, deployment, and testing automatically with workflows. All our workflows runs on Ubuntu Linux. Each of the

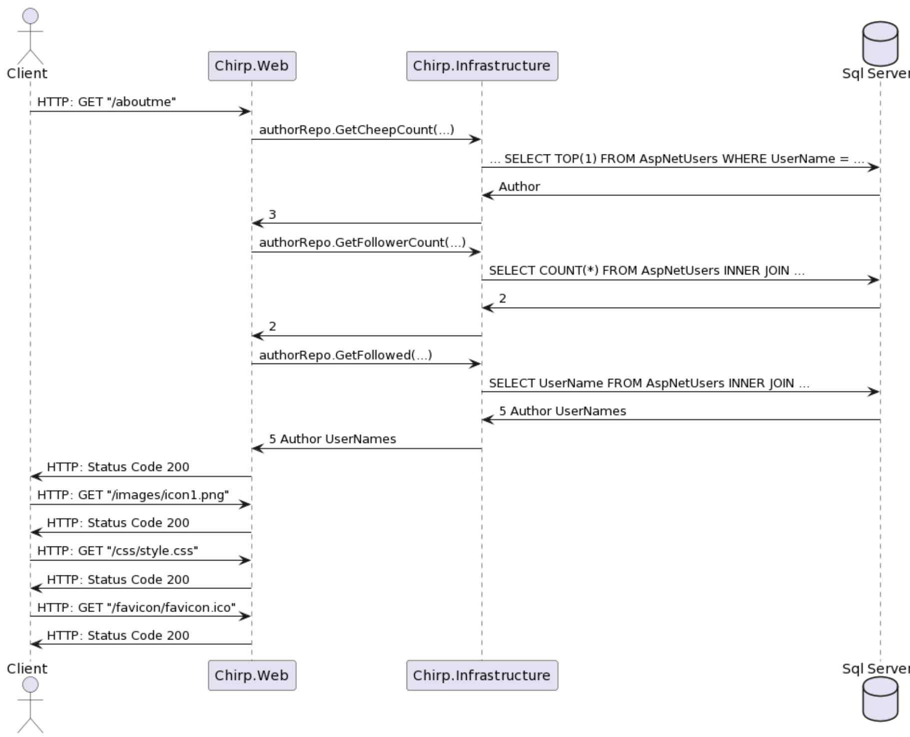


Figure 7: Client visiting "/aboutme" as a Sequence Diagram.

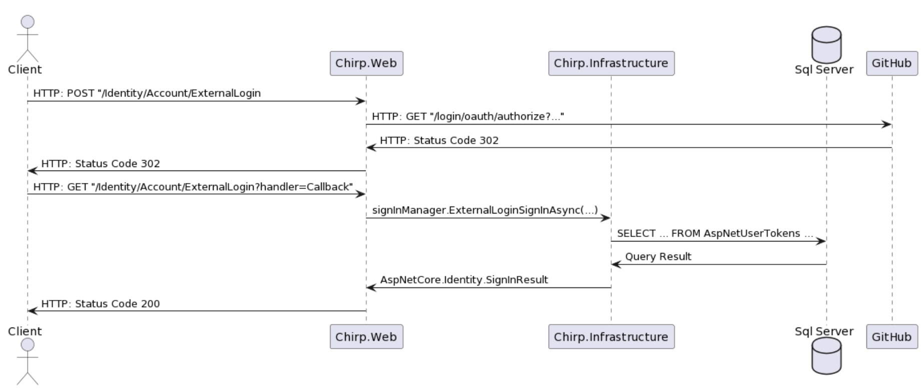


Figure 8: Client visiting "/Identity/Account/ExternalLogin" as a Sequence Diagram.

following Activity diagrams illustrates the flow of our workflows.

2.1.1 Build and Test

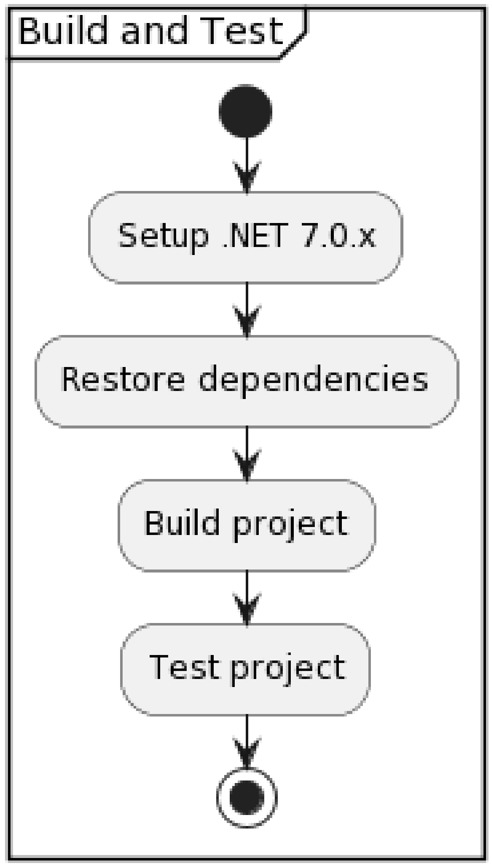


Figure 9: Build and Test workflow as an Activity diagram.

This workflow runs automatically on every push on any branch, and it simply builds and tests the project. This is useful because it can give some baseline information on the status of a commit, and it makes it easier to catch errors early. It helps check if a branch/pull requests can be merged into the main branch. It uses the Checkout Action to retrieve the commit that triggered this workflow, and the Setup-dotnet Action that prepares a .NET CLI environment, which in our case uses any 7.0.x version of .NET.

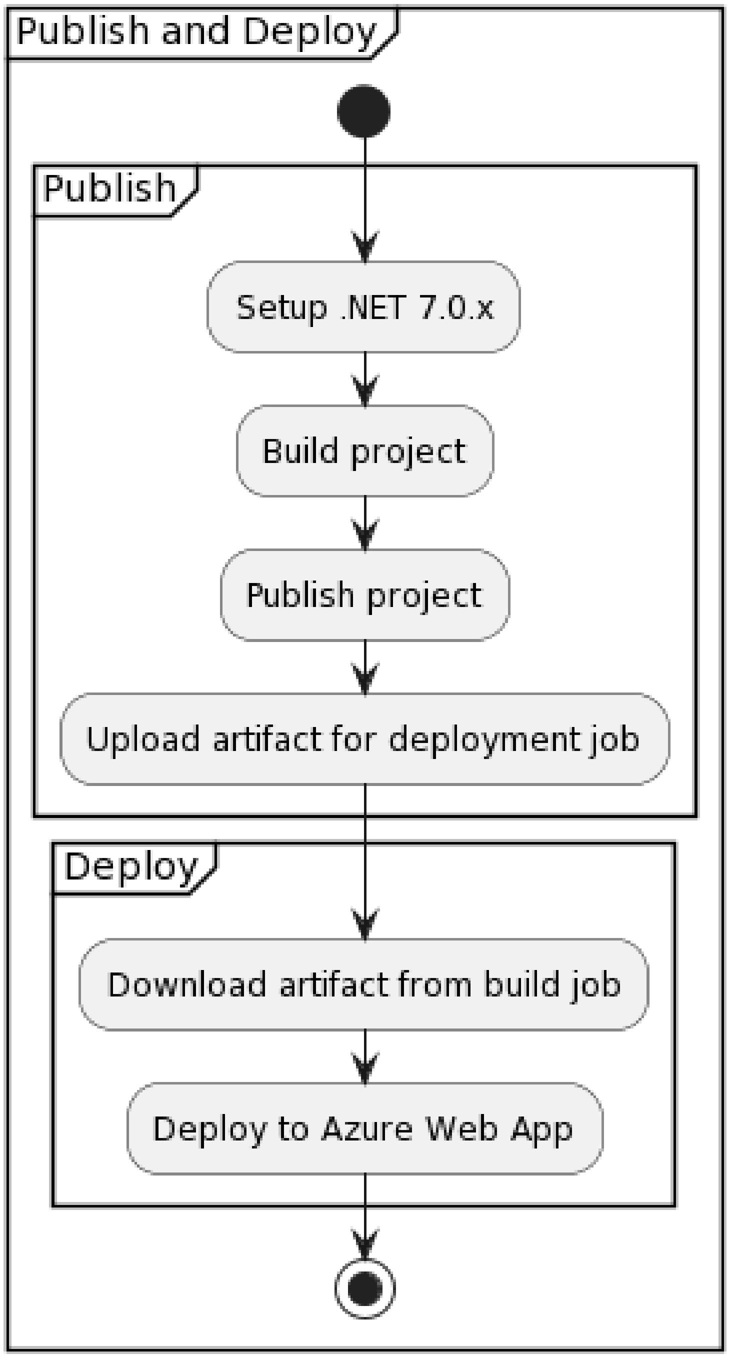


Figure 10: Publish and Deploy workflow as an Activity diagram.

2.1.2 Publish and Deploy

This workflow runs automatically on every push to the main branch. It builds the project and deploys it to our Azure Web Service. This workflow is split into two jobs: publish and deploy. The publish job similarly to the Build and Test workflow except it doesn't test, but instead runs the `dotnet publish` with the Chirp.Web project that produces the files, that is sent to the Web Service. The files are uploaded via the Artifact Action, which allows them the be downloaded again later so that they are available for the deploy job. The deploy job uses the Azure Webapps Deploy Action to deploy the application. A benefit of splitting the workflow into multiple jobs is that if any of the jobs fails, you don't need to rerun *all* the previous jobs.

2.1.3 Publish and Release

This workflow runs automatically on every push with a tag that has the pattern: "v..*". It first builds and tests the project, to make sure we don't unintentionally release a version that fails our tests. It uses `dotnet publish` like the Publish and Deploy workflow, except it publishes the project for each of the operating systems: Windows, Linux, and MacOS on x64 architectures using a simple bash script that also zips the files into files with names like the following: `Chirp-<tag>-<os>-x64.zip`. The Files as well as the source code is then added to a new *Chirp!* release on GitHub with the chosen tag as the version number.

2.2 Team work

The following image shows the project board right before hand in.

The issues we did not get to, were caused by some issues with not being able to run docker for all group members, and Playwright not working. We did also not have the time to implement reactions.

The flow of activities in our group is illustrated below.

After lectures, group members made issues from the tasks in the readme files from the lecture notes. These issues were then implemented in branches, and merged into main with pull requests. Pull requests require other group members to accept them.

2.3 How to make *Chirp!* work locally

Requirements to run *Chirp!* locally: * .NET 7.0.x SDK * .NETCore 7.0.x Runtime * AspNetCore 7.0.x Runtime

2.3.1 Download and run

1) Download the latest release from the releases page.
2) Extract the zip file.

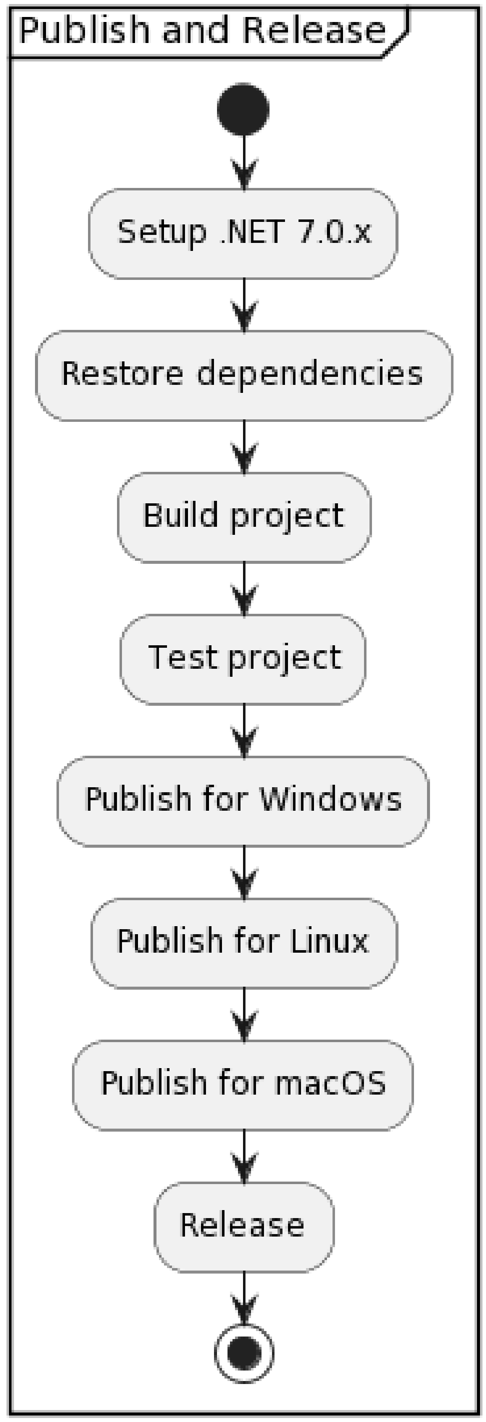


Figure 11: Publish and Release as an Activity diagram.

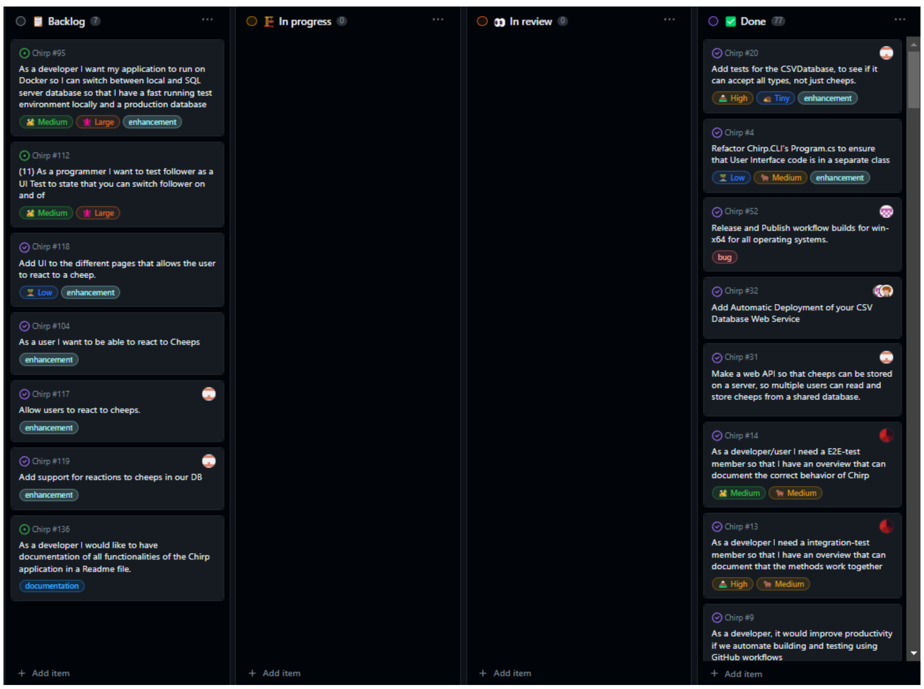


Figure 12: Project board.

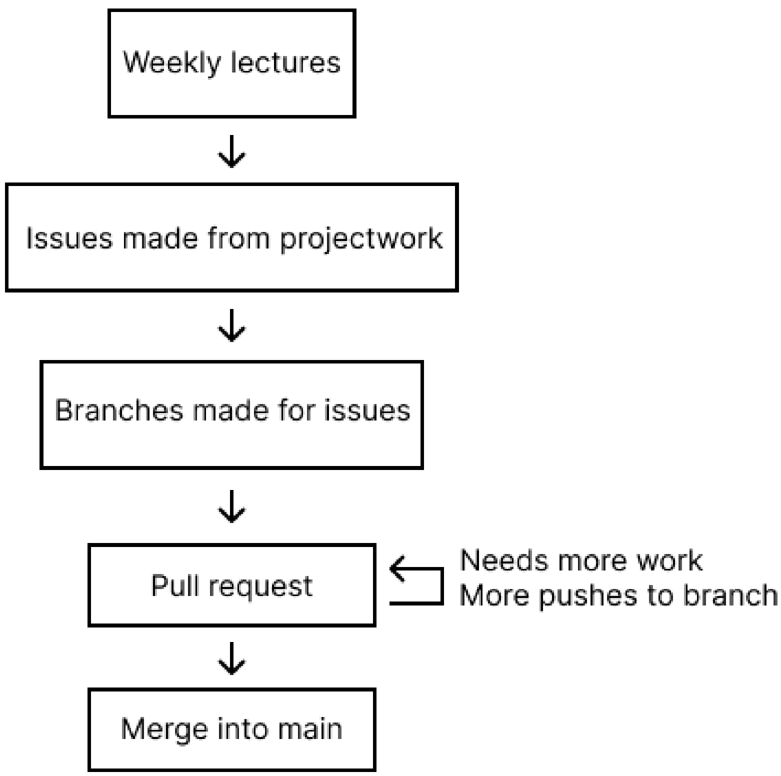


Figure 13: Activity flow.

3) Open a terminal in the extracted folder.
4) Run executable.

2.3.2 Building from source

1) Clone the repository

```
git clone https://github.com/ITU-BDSA23-GROUP13/Chirp.git
```

2) Change directory to the repository

```
cd Chirp
```

3) Run the project

```
dotnet run --project src/Chirp.Web
```

2.3.3 Additional functionality

Without further configuration, *Chirp!* will use a Sqlite database stored in a temporary folder. To use a Sql Server database, you must locate the src/Chirp.Web/appsettings.Development.json file with you chosen editor and change the connection string next to AZURE_SQL_CONNECTIONSTRING with a valid connection string. Using GitHub as a third-party OAuth login provider will also be disabled, but can be enabled by setting the CHIRP_GITHUB_CLIENT_ID and CHIRP_GITHUB_CLIENT_SECRET environment variables.

2.4 How to run test suite locally

Assuming you have done the steps from above, you simply have to run the following command in the root of the repository:

```
dotnet test
```

This will run all of the test using in-memory Sqlite databases.

3 Ethics

3.1 License

Chirp! uses the MIT license. This license was chosen because it is a very permissive license, which we don't mind as *Chirp!* was only developed for educational purposes. It is also very short and simple to understand.

3.2 LLMs, ChatGPT, CoPilot, and others

ChatGPT and GitHub Copilot has been used the authors of *Chirp!*.

The use of ChatGPT has been *very* minimal, and no code was directly copied from ChatGPT. It has been used by some authors to help understand some concepts or error messages. It has also been used to answer more creative questions such as what kinds of reactions would fit the theme of *Chirp!* if we wanted to add reactions to Cheeps.

GitHub Copilot has also been used by some authors, but it has been used exclusively as a tool to write code/boilerplate *faster*. Some editors allow you to disable Copilot from automatically suggesting code, and instead use a keybinding to manually make Copilot come with a one-time suggestion. This has the benefit of making Copilot not show suggestions when it is not needed, which is the vast majority of the time we spend coding. Though, we do find Copilot to be very useful when we write boilerplate/repeating/obvious code, and in these cases Copilot can be manually enabled to generate the code. In other words, Copilot has primarialy been used to generate code that we already intended to write, and not to generate new code that we didn't understand.