

# CS 319 - Object Oriented Software Engineering

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## BilHealth Design Report

Iteration 1



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# 1 Introduction

## 1.1 Purpose of the System

## 1.2 Design Goals

# 2 High-Level Software Architecture

## 2.1 Subsystem Decomposition

## 2.2 Hardware-Software Mapping

## 2.3 Persistent Data Management

The project makes use of PostgreSQL as its persistent data storage solution. The project does not have specific requirements that directly justify the use of PostgreSQL, however, this database system is well rounded enough to save the development process from any potential drawbacks. The `psql` command line tool is easy to use and supports our workflow in implementing database migrations. Also, the Docker images for the database are robust and simple, which has allowed the project to be supported by a containerized database.

On top of the actual database, the project uses EF Core as an object relational mapper (ORM), which is Microsoft's official library for data persistence. We use the recommended *code-first* approach of database management, which means our PostgreSQL tables are constructed by EF Core with respect to our entity definitions in C# code. The EF Core toolchain generates migrations, which it also converts to SQL scripts, using which a database can be configured to host the project in moments.

## 2.4 Access Control and Security

## 2.5 Boundary Conditions

# 3 Low-Level Design

## 3.1 Object Design Trade-Offs

## 3.2 Final Object Design

## 3.3 Packages

- `Microsoft.AspNetCore:`  
This package is the framework supporting the entire web application.
- `Microsoft.EntityFrameworkCore.Design:`  
This package allows the EF Core migration tool to work on the project.
- `Microsoft.AspNetCore.Diagnostics.EntityFrameworkCore:`  
This package allows debugging EF Core migrations.
- `npgsql.EntityFrameworkCore.PostgreSQL:`

This package is the database driver providing EF Core its interoperability with PostgreSQL.

- **Microsoft.AspNetCore.Identity.EntityFrameworkCore:**  
This package provides authentication and authorization of users through integration with EF Core.
- **BCrypt.Net-Next:**  
This package provides the BCrypt algorithms which are currently among the best in securing user passwords.
- **Microsoft.AspNetCore.Mvc.NewtonsoftJson:**  
This package is the most popular JSON library for .NET, used as the default solution in most cases.
- **Microsoft.AspNetCore.SpaProxy:**  
This package allows the .NET build process to launch and proxy with the client application.

## **3.4 Class Diagrams of Layers**

### **3.4.1 Data Access Layer**

### **3.4.2 Business Logic Layer**

### **3.4.3 User Interface Layer**

## **4 Glossary**