

# ADAPT Community Network Systems Design Document

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## Project Developers:

Darien Miller - Web Developer

Wilma Rodriguez - Project proposal & UI/UX developer

Revision History

Date	Version	Author	Changes

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## 1 Project Overview

### 1.1 Project Name:

This project will be called the ADAPT Community “Student Database”.

### 1.2 Project Description:

The ADAPT Community Networks student Database will track student course registration, attendance, and community participation. Student profiles will provide essential information, allowing for the compliance of transfer of care and community engagement protocols. Here is a summary of the feature this project will support:

1. Taking daily attendance for our classes
2. Adding new students to our classes
3. Creating and removing classes from our schedules
4. Submitting weekly schedules
5. Translating class and student data to pre-styled

As of now, all of the responsibilities above must be done manually, which is a common source of stress for the specialists. At its completion, the project will allow for the automation for every single responsibility in one place.

### 1.3 Stakeholders:

The student database project was introduced on November 11, 2022, by Education Specialist Wilma Rodriguez. The project received is supported by supervising management team: Peter Cobb, Shaniece Frank and Chevonne Brown. In 2025 the project evolve into a collaboration with computer specialist Darien Miller.

### 1.4 Assumptions:

Initially, this project was started in May, with a release sometime in September. Unfortunately, due to hardware failure, and a priority on another ADAPT project for jeopardy score keeping, the completion date for the first version had to be pushed back. With a new laptop, and the scorekeeping project completed, there can now be clear timelines for each milestone. Moving forward, I will proceed with the following assumptions:

#### Resource Assumptions:

- Serverside/Backend Development will be handled primarily by Darien Miller, with UI/UX and general aesthetics handled Wilma Rodriguez.
- Specialists will create test classes alongside test students for validation.
- Specialists will work within a stable and easy to use environment.

**Technology Assumptions:**

- For the back-end, all data processing will be done with ASP.NET, with views being handled By HTMX and Alpine.js for interactivity.
- Class and student data will be exported to the official specialist, pre-styled excel sheet.
- All class and student data will be managed by a relational database, most likely PostgreSQL.

**Scope Assumptions:**

- Version 1.0 will include the ability to add classes, students, and export to excel sheets.
- Additional features like the admin dashboard will be released with later versions of the app.

**Risk Assumptions:**

- No other projects will interfere with the development timeline of this project
- Staff will be able to start using it as soon as the app is released.

**Dependency Assumptions:**

- Specialists will access the application through modern browsers (Chrome, edge, Safari, etc).
- Application will be hosted on existing IT infrastructure.

**Milestones:**

- Version 1.0 release date - **10/25**
  - - Features: Add classes, Add students, export them to excel
- Version 1.1 release date - **11/1/25**
  - - Features: Admin page for supervisors to view specialists classes.

**1.5 Core-features:**

This project as mentioned before will consolidate every single responsibility into a single app to reduce complexity and improve efficiency. Here is a summary of the features:

- Add classes
- Add Students
- Export classes and files to excel
- Admin page for supervisors to view and edit classes/schedules
- Create weekly schedules

## 2 Functional Requirements

### 2.1 Performance:

#### Response Times

- The ideal response times for adding new students, adding new classes, and adding students to classes should ideally fall within 1-2 seconds assuming a solid internet connection.
- Generating the excel spreadsheet that contains all of the specialists classes, and students who attended for a specific month should ideally take no longer than 5 seconds.

#### Throughput/Concurrency

- This application should be able to very easily handle the load of all of the specialists using it at the same time, as there are only around 25 of us with classes and students to add.
- Max usage for the app should be at the end of each day, and near to the deadline for the monthly attendance sheet submission.

#### Transaction Rates

- During peak periods when the app is being used the most, a good benchmark for the amount of transactions per minute is 100, combining classes and students being added.

#### Client-Side Performance

- For solid internet connections, classes and students for each class should all load in at most two seconds, ideally under one second.
- Front-end interactions should be instant, and not really too much on re-loading the page to fetch new information.

### 2.2 Scalability:

Due to the internal nature of this application, and the limited number of ADAPT specialists using the application at any given time, **vertical scaling** will be the preferred scaling method. Horizontal scaling would require deploying the source code on multiple machines, and I currently do not have access to such resources, but even if I did, it would be overkill for this project. With vertical scaling, I can deploy a single instance to a cloud provider, and focus entirely on expanding it should the need ever come up for my team.

### 2.3 Security:

For security, I plan to implement all of the best practices for protecting log in, as well as other methods to satisfy HIPAA requirements and protect information about people-supported. Methods include:

- Anti-CSRF token for log in.



- Passwords will be hashed (scrambled) before being stored in the database.
- Session usage on the backend to maintain login/logout flow.
- Refresh tokens to prevent users from getting signed out too quickly.
- Sign up restricted to users with @adaptn emails.
- HTTPS for all data transmission.
- 2FA (2-factor authorization) using the authenticator app on mobile.
- Encryption for people-supported names for database.

## 2.4 Reliability:

This app should be as reliable as possible, and in order to meet that threshold, I will guarantee the app will meet several benchmarks set by me.

### Expected uptime:

Uptime is defined as the amount of time the website will actually be up and running, in contrast to downtime which is how long websites stay down. With this project being hosted on the free tier on the cloud service Azure, there will some down time as the website will “sleep” when not using , but it will only affect the first initial request, with each subsequent one operating normally.

### Data Durability:

Database will be backup every other day, with timestamps marked to date each backup

### Disaster Recovery:

- Disaster Recovery is defined as the ability for an application to recover valuable data should there ever be a breach, or some server related crisis that causes the application to shut down while in use. In such a scenario, there are some tools I have available to address them now, and better tools in the future to more effectively deal with it.
- As mentioned before, my cloud SQL database (Azure storage) will be backed up daily, with rollback to earlier versions possible should anything go wrong. Excel Attendance exports for each specialist can also function as back up data since it contains the classes and attendance marks for each student.
- In the case where the project has to be redeployed, moved to another cloud service, or even run from the source (this laptop) process will be made much simpler due to the application being containerized using docker.

### Failover Systems:

- A failover describes the process of the primary server automatically switching to another backup server should the primary server fail. Due to this project being hosted on a single cloud service with a single instance, the system must be manually restarted through the cloud service provider.
- As the project grows and becomes more widely adopted, load balancing will be adopted to distribute client requests to different servers and instances rather than just one as I am currently doing now.

## 2.5 Maintainability:

Here is a list of active practices that will be done to keep this project as maintainable as possible:

**Codebase Standards:**

- Every single file in this project will follow C# naming and styling conventions for clarity and consistency.
- Razor pages will be organized according to standard project hierarchy.
- For Class names, PascalCase will be used, and for variables, camelCase will be the default

**Dependency Management:**

Every single file- TBC

**Documentation:**

TBC

**Testing:**

For the purposes of testing, unit testing and integration testing will both be used to ensure every aspect of the application has accounted for every single possible edge case.

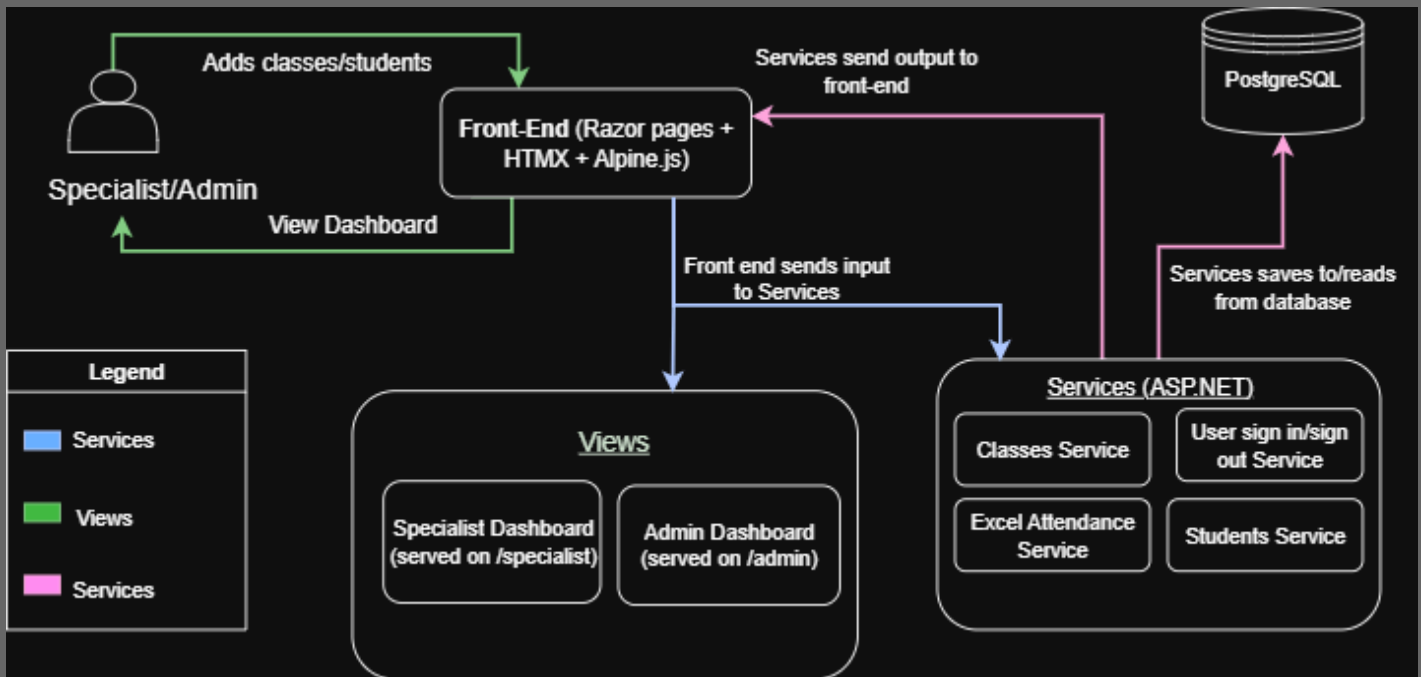
- **Unit Testing** is a type of test that checks each individual method, function, class, etc in isolation to ensure the expected outcome is returned.
- **Integration Testing** is a type of test that checks to see if different layers of the program interact with each other as intended, and also to ensure database connectivity is functioning. This type of test would test to see if passwords, usernames, and classes for example are all actually being saved to the database.

**Logging:**

### 3 System Architecture

#### 3.1 High-Level Diagram:

Here is the current system architecture diagram for the Attendance Tracker:



#### 3.2 Technology Stack:

For my Attendance Tracker, I decided to forego a full fledged JS Framework in favor of a more simple, server rendered front-end due to my previous project getting bloated with Vue.js. Though my experience was certainly not negative, I would like to have a smaller, simpler to maintain codebase for this project, which works well considering this project is smaller in scope than my previous one.

##### Front-end:

- [HTMX](#). This is an extension
- Alpine.js
- CSS
- Razor Pages

##### Back-end:

- C#
- ASP.NET

##### Database:

- PostgreSQL

Infrastructure:

- Docker
- Azure

### **3.3 System Components:**

## 4 User Interfaces

### Homepage

The homepage will require the creation of a username and password. Two-factor authentication (2FA) should also be enabled for added security.



# INSTRUCTOR PROFILES



**WILMA  
RODRIGUEZWILMA**  
EDUCATION SPECIALIST

Wrodriguez@ucpnyc.org



**TRISCA LAGHARI**  
ASST. MANAGER

hello@reallygreatsite.com



**CHUN HEI KIM**  
SENIOR SPECIALIST

hello@reallygreatsite.com



**ESTELLE DARCY**  
SENIOR SPECIALIST

hello@reallygreatsite.com



**JIARA MARTINS**  
JUNIOR SPECIALIST

hello@reallygreatsite.com



**MARGARITA PEREZ**  
INTERN





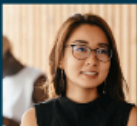

hello@reallygreatsite.com

## Instructor Profile – User Instructions

- Each instructor profile displays the following information:
  - Profile Photo
  - Full Name
  - Email Address
- To view an instructor's personal profile:
  1. The user locates the instructor of interest.
  2. The user clicks on the instructor's profile photo.
  3. The system opens the instructor's detailed profile page, where the user can find course information, instructor schedule, upcoming community trips, student caseload (1:1's and students that the instructor works closely with).
  4. Attendance record,
  5. Student progress records
  6. Teaching resources



# STUDENT PROFILES

 <p><b>JOHN S. SMITH</b>  <b>LOCATION: FLUSHING</b>  ADAPT E-mail</p>	 <p><b>TRISCA LAGHARI</b>  <b>ASST. MANAGER</b>  hello@reallygreatsite.com</p>
 <p><b>AMY PARIS</b>  <b>LOCATION: FLASHING</b>  ADAPT Email</p>	 <p><b>ESTELLE DARCY</b>  <b>SENIOR SPECIALIST</b>  hello@reallygreatsite.com</p>
 <p><b>JIARA MARTINS</b>  <b>JUNIOR SPECIALIST</b>  hello@reallygreatsite.com</p>	 <p><b>MARGARITA PEREZ</b>  <b>INTERN</b>  hello@reallygreatsite.com</p>

- Each student profile displays the following information:
  - Profile Photo
  - Full Name
  - Email Address





**John S Smith**  
PROGRAM: FLUSHING

John is an active participant in the Flushing program. He enjoys interacting with peers and supporting staff. Currently, John is pursuing his GED. He also enjoys participating in art and educational activities and has a deep interest in music.

Evaluation

Community Information

Weekly schedule

Attendance 

**Person Supported bio**



**The student profile tabs:**

**Evaluation**

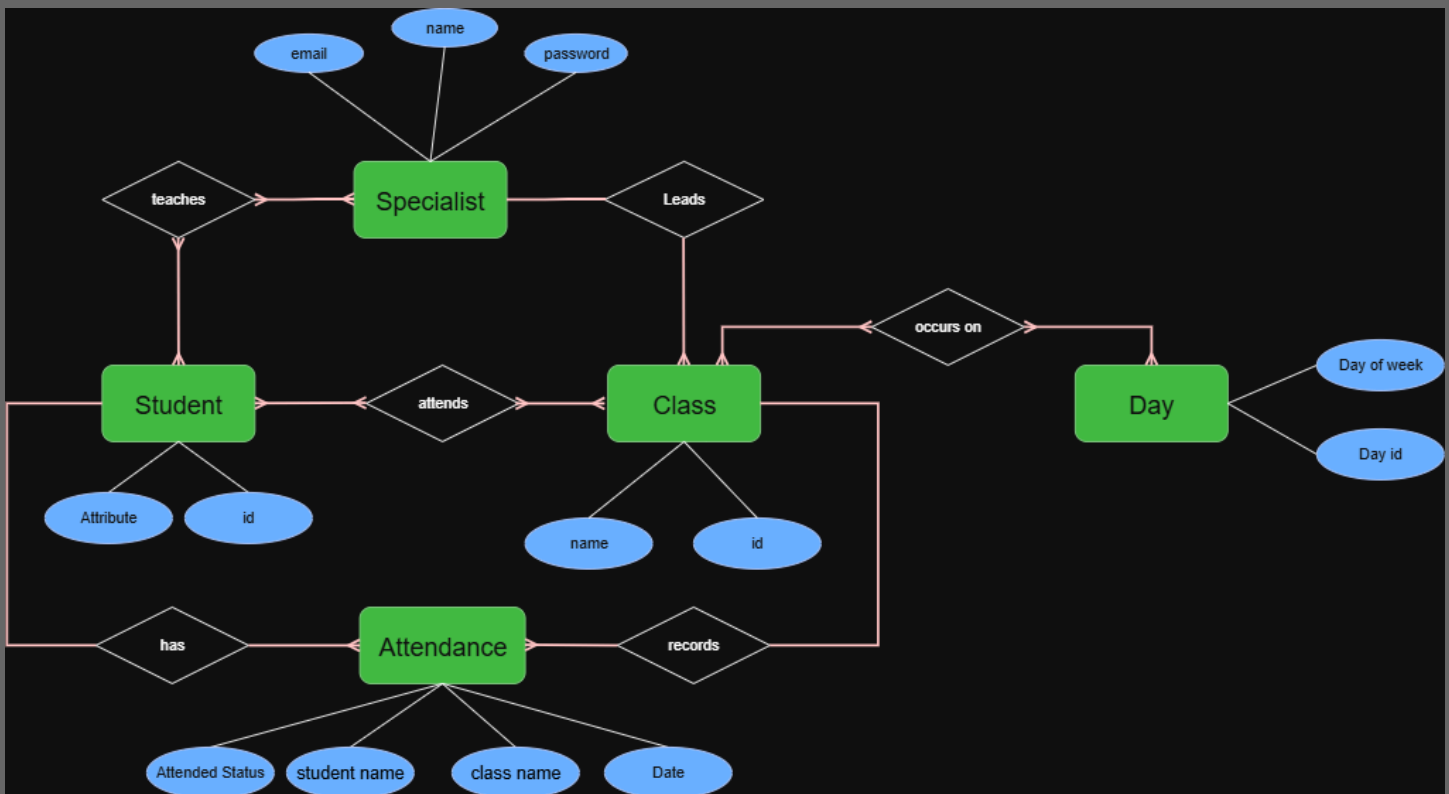
**Community details**

**Current courses**

## 6 Database Design

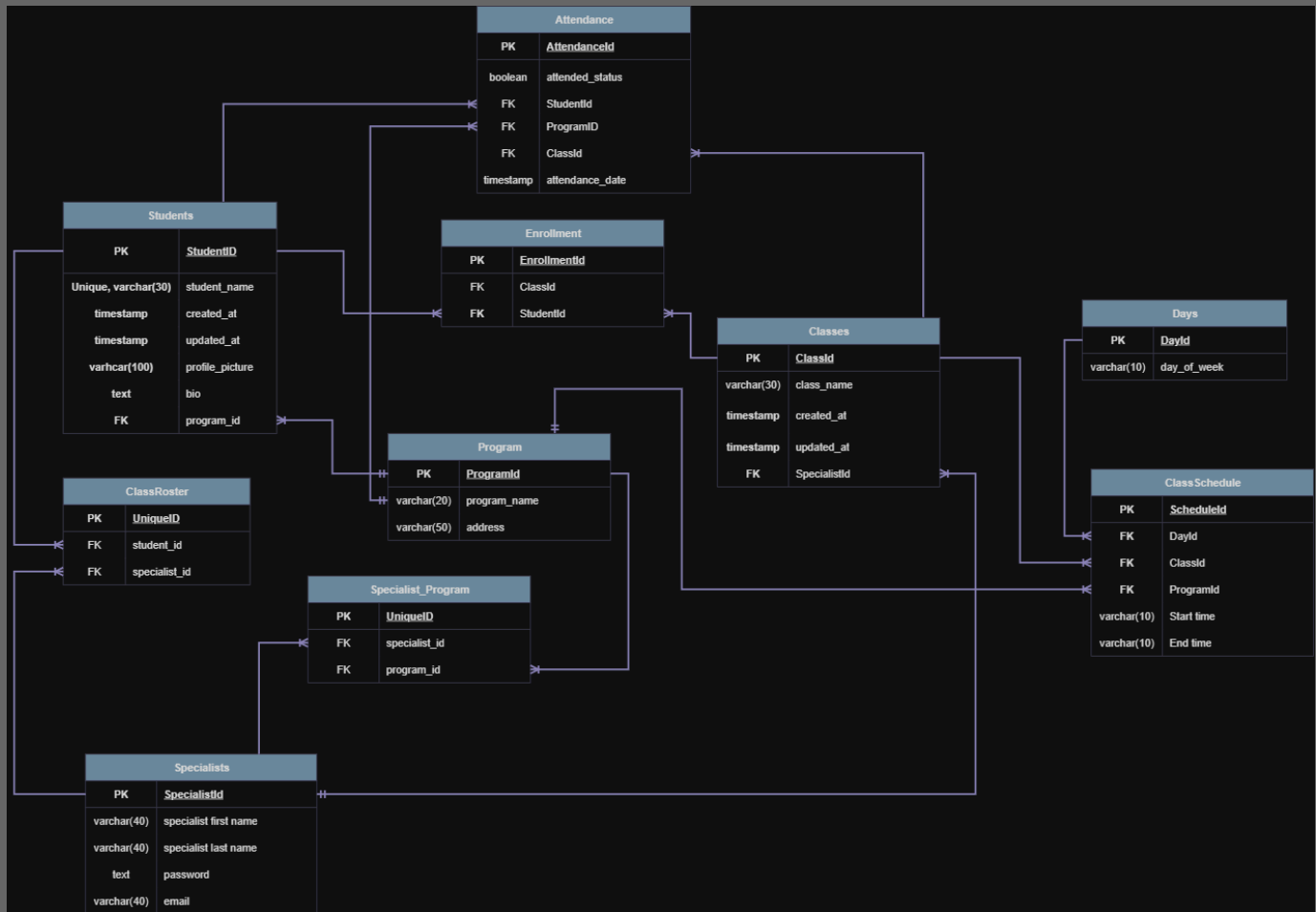
### 6.1 ER Diagram:

Here is the ER diagram for the database to be used for this project. For the initial release, there will be 5 tables: One for Specialists, one for students, one for classes, one for days of the week, and one for attendance. Students and classes will have a **many-to-many** with each other, classes will have a **one-to-many** with specialists, attendance will have a **one-to-many** relationship with students and Classes, and finally, classes and days will have a **many-to-many** relationship with each other.



## 6.2 Schema Diagram:

Here is the schema diagram for the actual database tables. There are 10 tables, with many also serving as junction tables for two other tables.



The following is a description of the database tables, and the relationships they have with each other:

**Students:** Students will hold all of the necessary data of all the students inputted by every single specialist using this application. Students will have a name, a bio, a profile picture, and their day program. Four other tables will interact with the students table: **Enrollment**, **Class Roster**, **Program**, and **Attendance**.

**Specialists:** Specialists will contain all of the information that specialists will need to use this app. Specialists will have first and last name, an email, and a password to log in with. The Specialists table will interact with three other tables: **Class Roster**, **Specialist program** and **Classes**.

**Enrollment:** Enrollment will hold the unique id of both the Student table and Class table. It will allow users to know which classes people-supported are enrolled in. This table will interact with Two other tables: **Classes** and **Students**.

**Attendance:** Attendance will allow specialists to record attendance for each of their students for every single class, for all program sites. Attendance will have a flag for 'P' or 'A', the unique ids of the student, class and day program, and the timestamp for when the attendance was taken. This table will interact with three other tables: **Students**, **Classes**, and **Programs**.

**Specialist Roster:** Specialist Roster will hold the roster of people-support that each specialist has, and which specialists each person-supported attends. Class Roster will hold the unique id of both the student and the specialist. This table interacts with two other tables: **Specialists** and **Students**.

**Class Schedule:** Class Schedule will contain all of the instances of each class that each specialist will have. Since specialists can have the same class at different times and different sites, this table will hold all copies of a single "base" class. Class Schedule will have the start and end times of the class, the id of the program where the class is being taught, the id of the base class, which day of the week it is. Three other tables reference this table, them being **Class**, **Program** and **Days**.

**Classes:** Classes will hold all of the information for the classes we specialists have to offer. Classes will have the class name, and the unique id of the specialist teaching the class. Four other tables reference this table, them being **Attendance**, **Enrollment**, **Specialist** and **Class Schedule**.

**Programs:** Programs will contain the names of all of the day hubs, or program sites for our people-supported, which is where our classes are hosted. Programs will have a name, and an address. Four other tables reference this table, them being **Attendance**, **Students**, **Class Schedule**, and **Specialist Program**.

**Specialist Program:** Specialist Program will tie together programs and specialists, determining each program every specialist goes to, and all of the specialists that work at a particular program. This table will have the unique id of each specialist, and each program. As mentioned before, two tables reference this table, them being **Specialists** and **Programs**.

**Days:** Days will simply hold the 5 days of the week when classes are held. Days will just hold on field, that being the name of the day. It will be referenced only by Class Schedule, so each class will know what day it's held on.

## 6.3 Indexes:

In database programming, an "Index" is a trade off that allows data to be retrieved significantly faster than normal, but it makes sending data to the database slightly slower than normal. Indexes should ideally be used when dealing tables that has generally met two conditions:

1. It has an enormous number of rows, in the tens of thousands or more.
2. The data from the table is retrieved extremely frequently across many users.

When looking at these two conditions, the table that would definitely benefit from be indexed would be the Attendance table, as it would accrue dozens of attendance per day, for each specialist, for each

person-supported. Every other table would only grow up to a certain point, since we only have a finite number of specialists, people-supported, classes and day programs.

## 6.4 Transactions:

When dealing with SQL databases, inevitably “transactions” will need to be done depending on how much data there is to handle, and how many tables the database will contain. A transaction will allow multiple database operations to be done in one clean action, rather than one by one. For example, if a student needs to be added to a new class, that represents two different operations: Adding a new student to the student table, and then connecting that student to a pre-existing class. Instead of doing them separately, transactions allow both actions to be combined into one larger one! Here are cases in which transactions would help maintain database integrity:

Matching a student to a Specialist:

- When adding a new student, a new relationship between that student is created with the specialist that added that student. Both the Students and SpecialistsRosters tables are updated.

Taking Attendance for a student:

- Taking attendance for a student involves creating a new relationship between

Adding an attendance record for a student:

Class creation and scheduling: