Github Repo:
https://github.com/mcbolin22/T2A2/tree/main/Desktop/Coder%20Academy/ColinHill_T2A2/Source%20Code

R1 Identification of the problem you are trying to solve by building this particular app.

Surveying a group of people, regardless of size, typically involves creating a poll, spreadsheet or a web form, this API takes the time-consuming and error prone hassle out of that. Simply sending a url to everyone you need to hear from and effortlessly getting those results back from another url.

R2 Why is it a problem that needs solving?

Poll creation and distribution is a time-consuming, error-prone endeavour that has limited reach and difficulty analysing results without some form of automation.

Creating polls from scratch, then distributing them and then on top of that collecting and analysing the results is a very tedious process particularly for a large audience. When distributing the poll in paper or email form its also not as efficient as having a centralised link to input your details and make your choice on the poll. When collecting the responses in which ever form they are in will require extra steps to manually enter data from paper polls or emails and can lead to errors and is not the most time efficient venture.

A poll making API streamlines these considerations by automation and facilitating analysis and data accuracy without extra steps where human error could be introduced. An API improves efficiency, accuracy, and reach when gathering opinions and data.

R3 Why have you chosen this database system. What are the drawbacks compared to others?

PostgreSQL was the appropriate choice for my API due to the following advantages:

Robustness and Scalability: PostgreSQL allows for larger datasets and can efficiently manage the data.

ACID Compliance: This ensures data integrity and consistency. Every vote is reliably stored and reflected in the results leading to more accurate poll results.

Feature Rich: PostgreSQL itself enhances scalability due to various features that can enhance the API. An example of this would be leveraging stored procedures to automate complex polling logic or utilising triggers to enforce data validation rules as the API becomes more sophisticated.

Open source and free: PostgreSQL will ensure usability without licensing which ensures the API's database is always working and manageable.

The drawbacks however are apparent when comparisons are made with alternatives such as NoSQL.

NoSQL is a more appropriate database for a simpler polling API due to potentially faster write speeds and easier schema changes. However, the disadvantages such as lack of robust data querying capabilities and ACID compliance means that PostgreSQL is the more appropriate database to use for complex polls with intricate logic or advanced filtering results.

R4 Identify and discuss the key functionalities and benefits of an ORM

Functionalities:

- Object-Relational Mapping: The core functionality. It defines how your program's objects map to database tables and how object properties correspond to database columns. This allows you to interact with data using object-oriented syntax instead of writing raw SQL queries.
- CRUD Operations: ORMs provide methods for performing Create, Read, Update, and Delete (CRUD) operations on your data objects. These methods handle the underlying SQL generation and database interaction, saving you time and effort.
- Object-Relational Impedance Mismatch Management: Relational databases store data in tables with rows and columns, while object-oriented programming uses objects with properties and methods. ORMs manage this mismatch by automatically translating between the two structures.
- Data Validation: Many ORMs allow you to define validation rules within your object definitions. This helps ensure data integrity by catching invalid data before it's persisted to the database.
- Relationship Management: Relational databases excel at representing relationships between data. ORMs simplify managing these relationships by automatically translating object associations into appropriate database joins and foreign key constraints.
- Query Building: While some ORMs focus on high-level object interactions, others offer functionalities for building more complex SQL queries when needed. This provides flexibility for specific use cases.

Benefits:

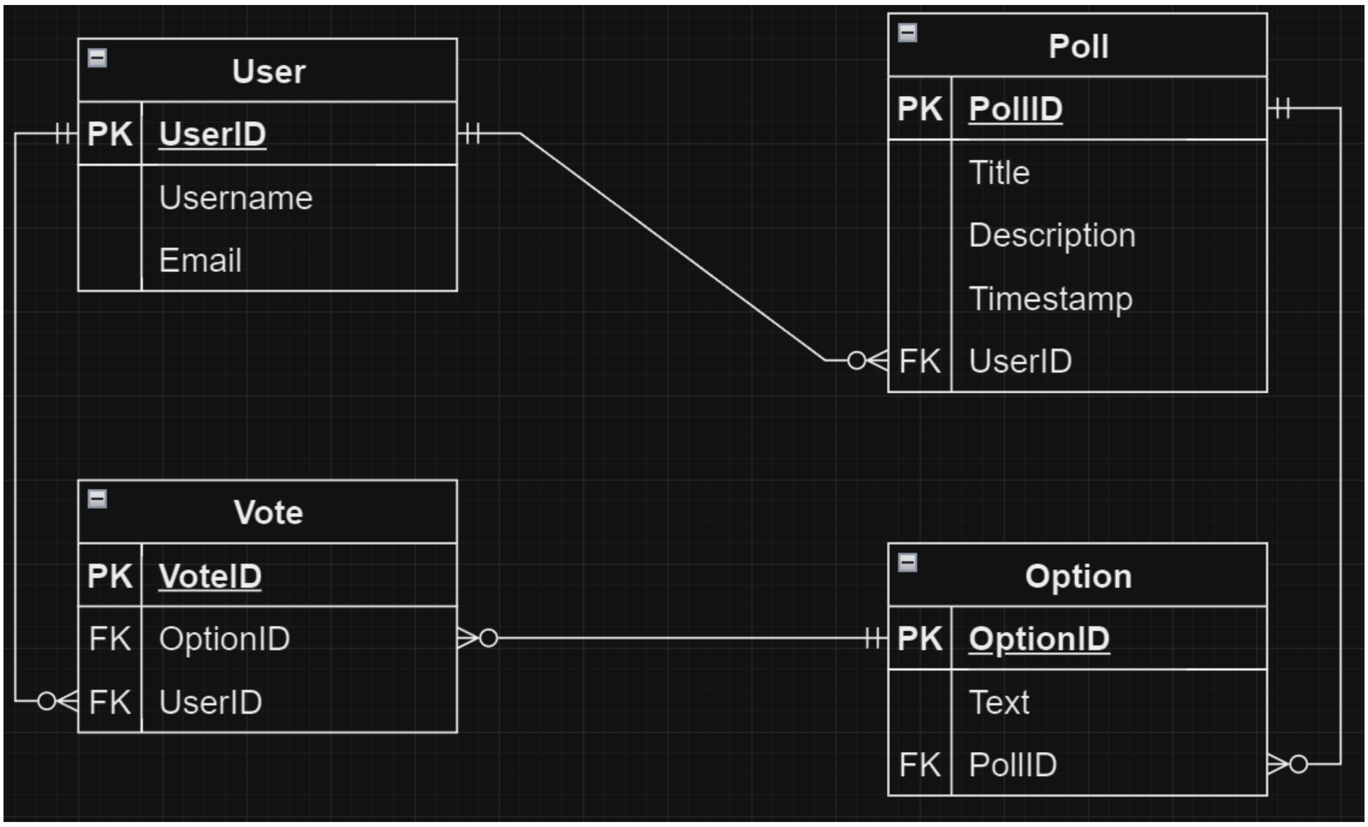
- Increased Developer Productivity: Using object-oriented syntax instead of raw SQL simplifies data access logic and reduces boilerplate code. Developers can focus on application logic rather than low-level database interactions.
- Improved Code Maintainability: Object-oriented code tends to be more readable and maintainable compared to raw SQL. This is especially true for complex queries, making it easier to understand and modify code in the future.
- Reduced Errors: ORMs can help prevent SQL injection attacks by automatically sanitizing user input before building database queries. This improves application security.
- Database Independence: Many ORMs support multiple database systems. By using an ORM with a well-defined mapping layer, you can potentially switch between database backends with minimal code changes. This provides flexibility for future needs.
- Object-Oriented Data Representation: ORMs naturally align with object-oriented programming paradigms. This promotes a clean separation of concerns and simplifies data modeling within your application.

R5 Document all endpoints for your API

Endpoint URL	HTTP Method	Description	Authentication
/user/register	POST	Register a new user	None
/user/login	POST	Log in a user (email validation only)	None

Endpoint URL	HTTP Method	Description	Authentication
/users	GET	Get all users	JWT (admin)
/users/int:user_id	GET	Get a user by ID	JWT (admin or self)
/users/int:user_id	DELETE	Delete a user by ID	JWT (admin)
/polls	GET	Get all polls	
/polls/int:poll_id	GET	Get a poll by ID	JWT
/polls/int:poll_id/results	GET	Get poll results (vote counts)	JWT
/polls	POST	Create a new poll	JWT
/polls/int:poll_id	PUT	Update a poll	JWT
/polls/int:poll_id	DELETE	Delete a poll	JWT (creator or admin)
/polls/int:poll_id/options	POST	Create a new poll option	JWT (creator or admin)
/polls/int:poll_id/options/int:option_id	DELETE	Delete a poll option	JWT (creator or admin)
/polls/int:poll_id/vote	POST	Cast a vote in a poll	JWT

R6 An ERD for your app



R7 Detail any third party services that your app will use

Web Framework: Flask Database: SQLAlchemy, psycopg2 and PostgreSQL Authentication: JSON Web Token (JWT) and bcrypt Data Serialisation: Marshmallow and Marshmallow_SQLAlchemy

R8 Describe your projects models in terms of the relationships they have with each other

User: This model represents a user of the system Poll: This model represents a poll created by a user Option: This model represents an option to consider by a user in a poll Vote: This model represents a vote on an option by a user in a poll

Relationships: User to Poll: One-to-many relationship connected through a foreign key within Poll. One user can create many polls but a poll belongs to one user.

Poll to Option: One-to-many relationship connected through a foreign key within Option. One poll can have many options but an option belongs to only one poll.

Poll to User (through Vote): Many-to-many relationship connected through a foreign key within Vote acting as a bridge between User and Poll without directly connecting them. A poll can have many votes cast by different users, and a user can cast votes on many polls.

Vote to Option: Many-to-one relationship connected through a foreign key within Vote. Many votes can be cast for a single option, but a vote is cast for only one option.

So using an example:

- One User (User A) created the Poll. (one-to-many)
- The Poll has two Options ("Option 1" and "Option 2"). (one-to-many)
- Two Votes were cast (one by User A and another by User B). (one-to-many for User and Vote)
- Each Vote is for a specific Option within the Poll. (many-to-one for Vote and Option)

R9 Discuss the database relations to be implemented in your application

Core Tables

- User: This table represents a user and has attributes like User ID (primary key), Username (unique) and Email (unique) (Password not required to use this API).
- Poll: This table represents a poll and has attributes like Poll ID (primary key), User ID (foreign key referencing User.User ID - one-to-many relationship), Title, Description (optional), and Created At.
- Option: This table represents an option within a poll and has attributes like Option ID (primary key), Poll ID (foreign key referencing Poll.Poll ID - one-to-many relationship), and Text (the content of the option).
- Vote: This table represents a vote cast by a user and has attributes like Vote ID (primary key), Poll ID (foreign key referencing Poll.Poll ID - many-to-many achieved indirectly), Option ID (foreign key referencing Option.Option ID - many-to-one), and User ID (foreign key referencing User.User ID - one-to-many).

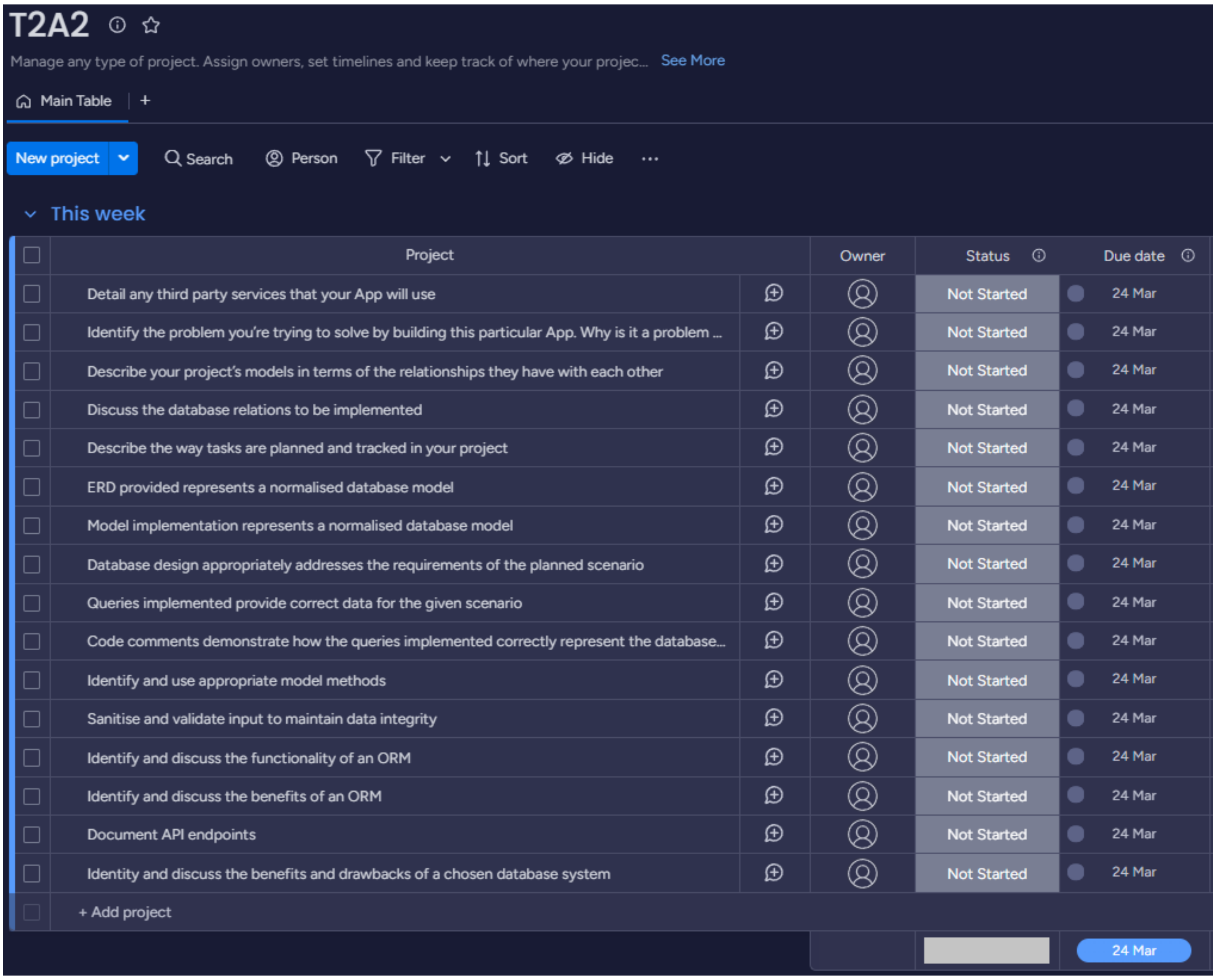
Relationships:

- User and Poll (One-to-Many): A user can create many polls, but a poll belongs to only one user. This is enforced by the foreign key User ID in the Poll table referencing the primary key User ID in the User table.

- Poll and Option (One-to-Many): A poll can have many options, but an option belongs to only one poll. This is enforced by the foreign key Poll ID in the Option table referencing the primary key Poll ID in the Poll table.
- User and Poll (Many-to-Many achieved indirectly through Vote): A user can vote on many polls, and a poll can have many votes cast by different users. This is achieved through the Vote table. The foreign key User ID in the Vote table references the User table, and the foreign key Poll ID in the Vote table references the Poll table. A single Vote record links a specific User and Poll with the option they voted for (linked through Option ID).

R10 Describe the way tasks are allocated and tracked in your project

Using the assessment rubric as the core criteria of the project I utilised Monday.com as a Project Management tool to track them and check them off.



T2A2

Manage any type of project. Assign owners, set timelines and keep track of where your projec... See More

Main Table | +

New project | Search | Person | Filter | Sort | Hide | ...

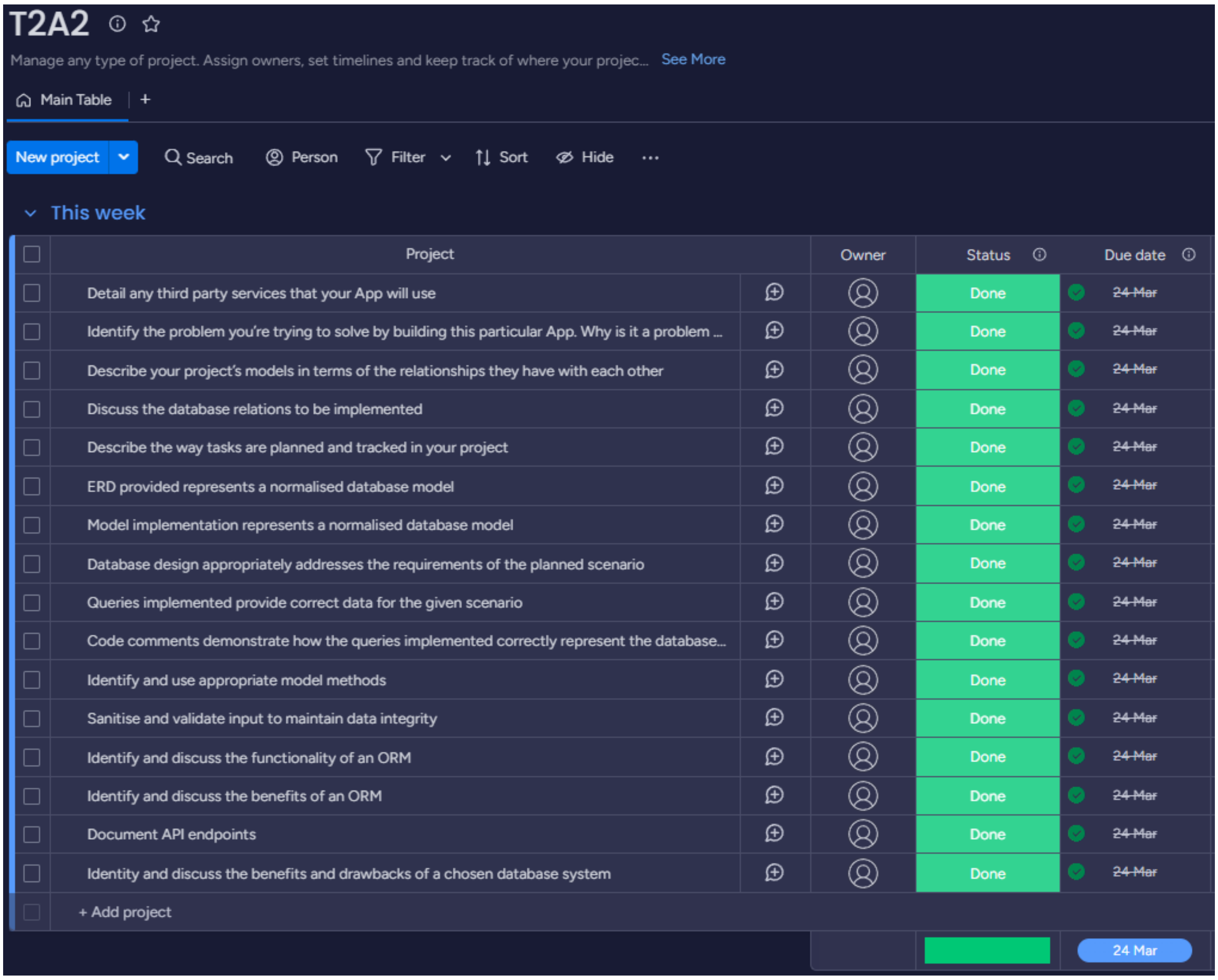
This week

Project	Owner	Status	Due date
Detail any third party services that your App will use		Not Started	24 Mar
Identify the problem you're trying to solve by building this particular App. Why is it a problem ...		Not Started	24 Mar
Describe your project's models in terms of the relationships they have with each other		Not Started	24 Mar
Discuss the database relations to be implemented		Not Started	24 Mar
Describe the way tasks are planned and tracked in your project		Not Started	24 Mar
ERD provided represents a normalised database model		Not Started	24 Mar
Model implementation represents a normalised database model		Not Started	24 Mar
Database design appropriately addresses the requirements of the planned scenario		Not Started	24 Mar
Queries implemented provide correct data for the given scenario		Not Started	24 Mar
Code comments demonstrate how the queries implemented correctly represent the database...		Not Started	24 Mar
Identify and use appropriate model methods		Not Started	24 Mar
Sanitise and validate input to maintain data integrity		Not Started	24 Mar
Identify and discuss the functionality of an ORM		Not Started	24 Mar
Identify and discuss the benefits of an ORM		Not Started	24 Mar
Document API endpoints		Not Started	24 Mar
Identity and discuss the benefits and drawbacks of a chosen database system		Not Started	24 Mar
+ Add project			
			24 Mar

The priority of my tasks were as follows:

1. Have a clear picture as to what the API would do and be used for.
2. Generate an ERD and get the idea approved on Discord.
3. Write the code and ensure that the idea worked as designed in the ERD.
4. Produce this ReadMe document.
5. Fault find ensuring the code was what the rubric specified (ie comments and data sanitisation)

Once the rubric has been completed I was able to put the finishing touches on this ReadMe.



T2A2

Manage any type of project. Assign owners, set timelines and keep track of where your projec... See More

Main Table | +

New project | Search | Person | Filter | Sort | Hide | ...

This week

Project	Owner	Status	Due date
Detail any third party services that your App will use		Done	~~24 Mar~~
Identify the problem you're trying to solve by building this particular App. Why is it a problem ...		Done	~~24 Mar~~
Describe your project's models in terms of the relationships they have with each other		Done	~~24 Mar~~
Discuss the database relations to be implemented		Done	~~24 Mar~~
Describe the way tasks are planned and tracked in your project		Done	~~24 Mar~~
ERD provided represents a normalised database model		Done	~~24 Mar~~
Model implementation represents a normalised database model		Done	~~24 Mar~~
Database design appropriately addresses the requirements of the planned scenario		Done	~~24 Mar~~
Queries implemented provide correct data for the given scenario		Done	~~24 Mar~~
Code comments demonstrate how the queries implemented correctly represent the database...		Done	~~24 Mar~~
Identify and use appropriate model methods		Done	~~24 Mar~~
Sanitise and validate input to maintain data integrity		Done	~~24 Mar~~
Identify and discuss the functionality of an ORM		Done	~~24 Mar~~
Identify and discuss the benefits of an ORM		Done	~~24 Mar~~
Document API endpoints		Done	~~24 Mar~~
Identity and discuss the benefits and drawbacks of a chosen database system		Done	~~24 Mar~~
+ Add project			
		🟩	24 Mar