IoT Data Aggregation Pipeline

Development Team

- Name
  - Team GR
- Members
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Project Purpose

The purpose of this project is to devise a data pipeline template that can collect atmospheric data from the interior of multiple facilities. This will be accomplished by sending real time atmospheric data from a network of IoT devices to a self-hosted, facility-specific server. The server will then aggregate the collected data and send each batch to a central SQL database. Note that this database will be used to store data from other facilities as well. Additionally, there will be a headless web API that authorized users can use to query batches of data from the database.

Project Goals

- Develop a data pipeline template that can be implemented and extended by others
- Demonstrate the benefits of implementing a data pipeline in house (affordable, extensible, easy to maintain)
- Evaluate emerging technology

User Stories - 1/2

- As a *system administrator*, I want a system that is easy to set up and maintain, so that I can more easily stay up to date with other tasks.
- As a *data analyst*, I want a data pipeline that allows me to quickly access and view data, so that I can more easily make decisions based on the data collected.

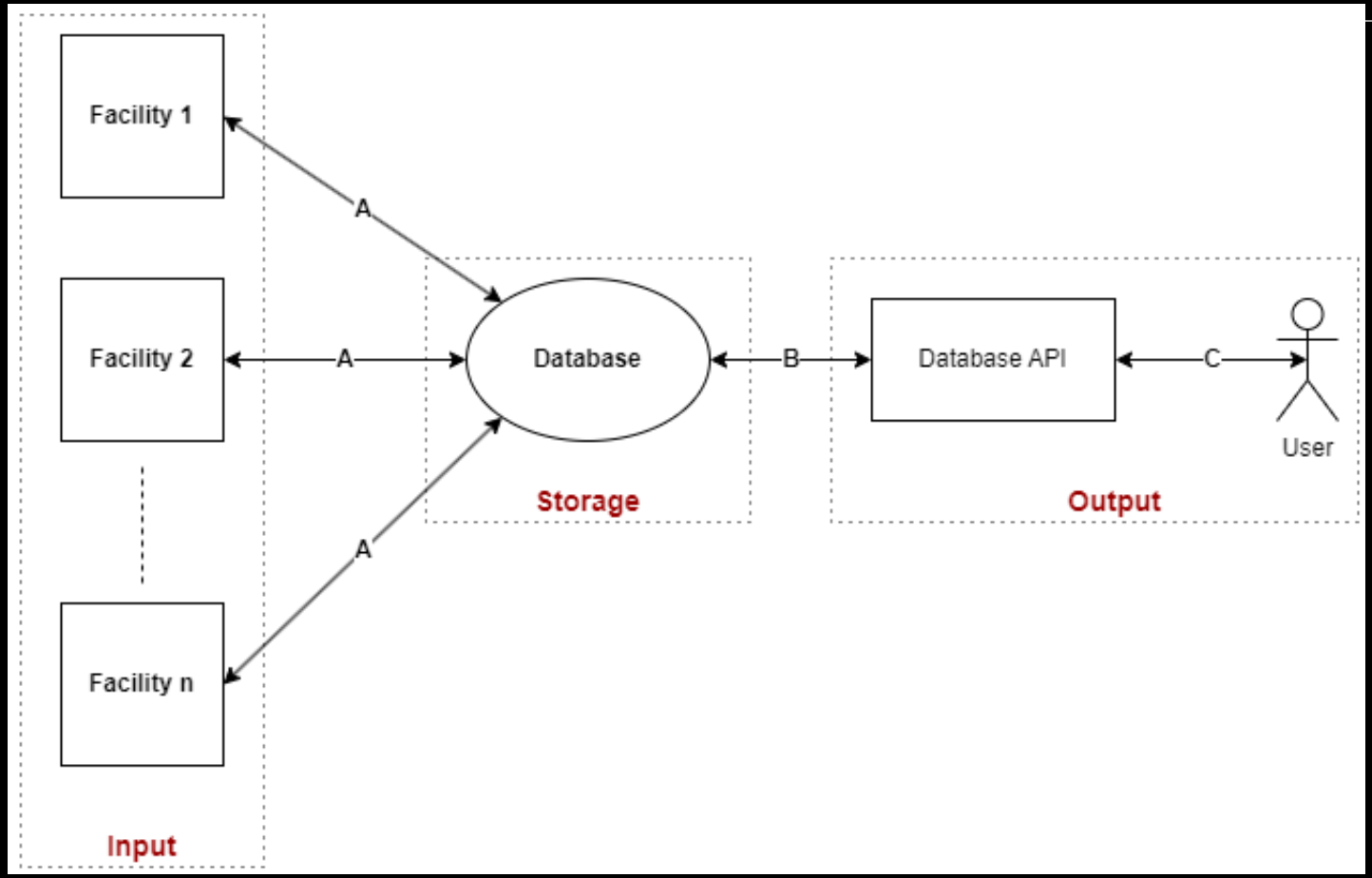
User Stories - 2/2

- As a *systems engineer*, I want a data pipeline that is easy to extend, so that I can add and remove functionality as system requirements change.
- As a *project manager*, I want a data pipeline that is cheap to operate, so that my team can have a larger portion of funding available.

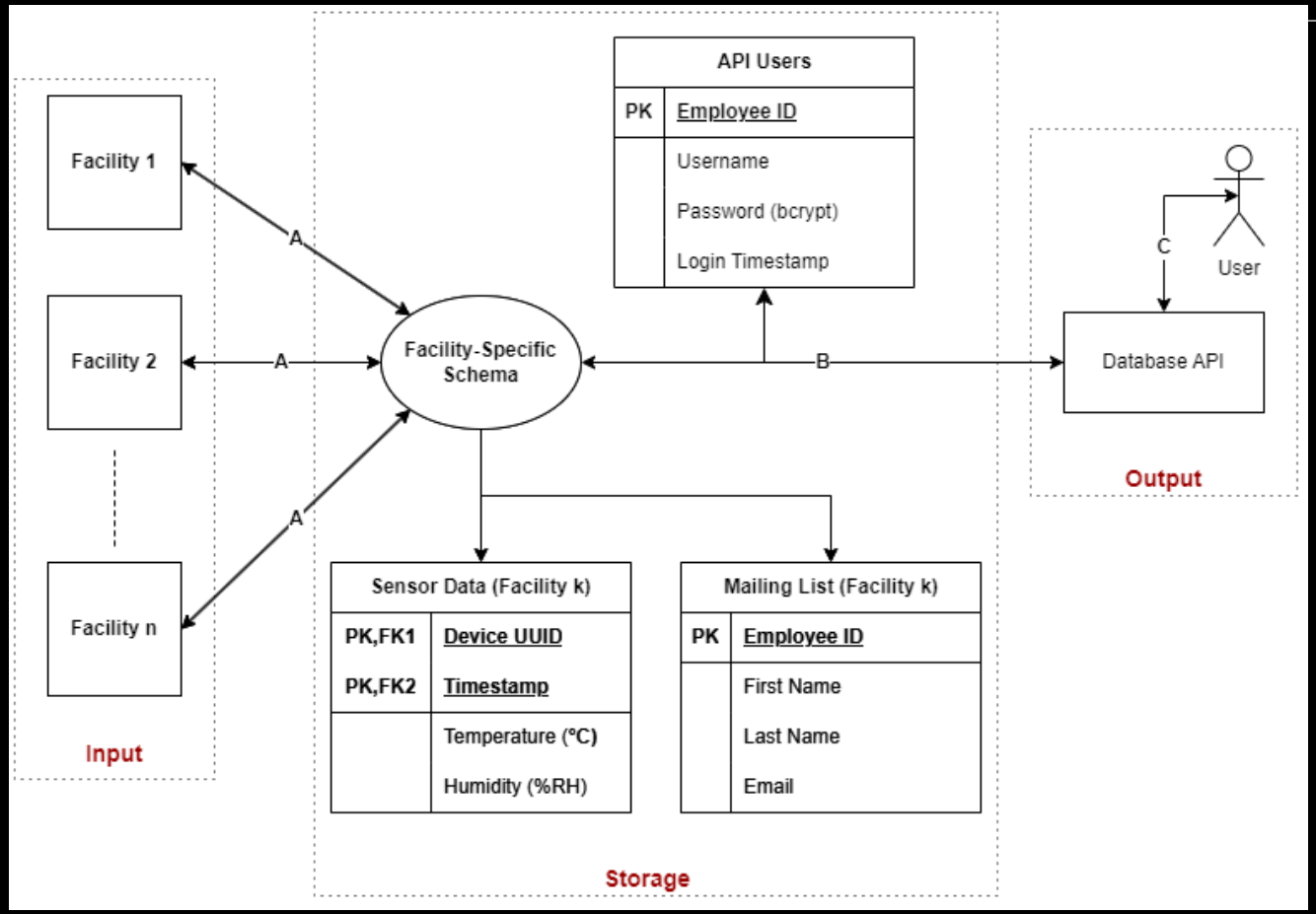
Project Constraints

- Limited budget
- Security
- Licensing
- Interdisciplinary knowledge

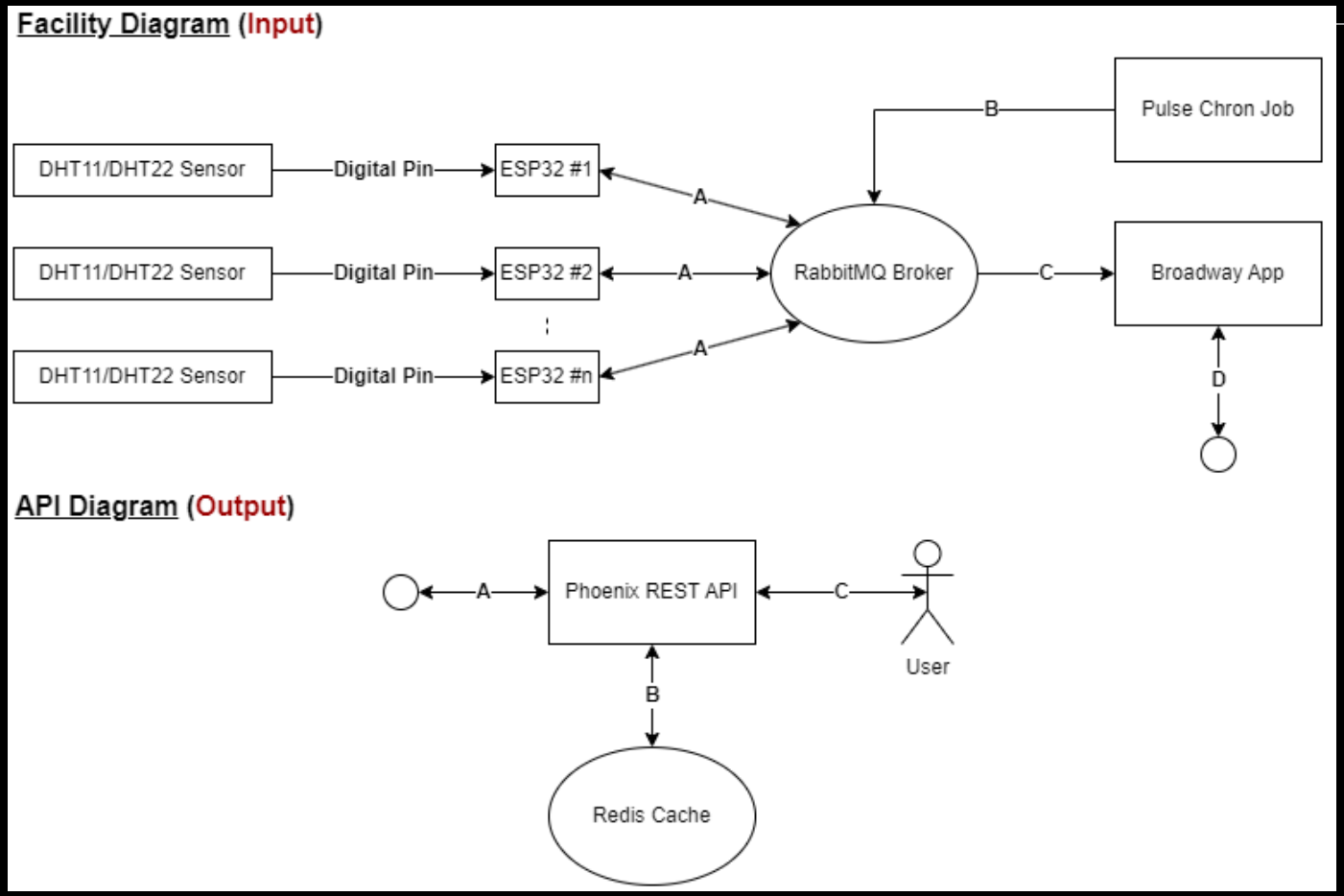
Design Diagram D0



Design Diagram D1



Design Diagram D2



Current Project State

- RabbitMQ Message Broker
  - MQTT and TLS enabled
  - Automated user configuration
- Firmware Proof-of-Concept (POC)
  - Failed attempts with Rust on ESP (std and no_std)
  - Success with ESP-IDF and Platform IO

End of Term Deliverables

- Wrap-up Firmware POC
  - Upgrade MQTT version from v3.1 to v5
  - Update project documentation
- Create Local Server POC, along with pertinent documentation

Proposed Expo Demo

- Poster illustrating each subsystem
- An example IoT device to let the audience hold
- A potential live demo of the API