

## **ParentAidATX Phase 4 Technical Report**

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**1. Phase 4 Overview**

- a. In phase 4, we polished the website and added data visualizations for our API and our developers' API. In addition to containing phase 4 information, this final report also contains information from all previous phases.

## **2. Introduction**

### **a. Purpose**

- i.** ParentAidATX empowers single parents in Austin, Texas, by simplifying access to essential resources, including family-related government assistance, affordable housing, and childcare services. Navigating support systems can be overwhelming, especially for single parents balancing work and family. ParentAidATX bridges this gap by connecting users to tailored programs and services, making it easier to understand eligibility, find nearby affordable housing, and locate quality childcare. We believe every parent deserves support, and every child deserves stability.

### **b. Questions Our Website Will Answer**

- i.** What are some helpful books for single-parenting?
- ii.** Where can I find affordable housing near my child's daycare or school?
- iii.** What are the best childcare centers that fit my preferred times and style of education for my child?
- iv.** What books are available for housing and childcare?

### **3. Models and Instances**

#### **c. Model 1: Books**

##### **i. Instances: ~100**

##### **ii. Attributes**

1. Author
2. Date of Publication
3. Page Count
4. Price
5. Category (Parenting, Childcare, or Housing related)
6. Description
7. Link to Purchase Book

##### **iii. Media**

1. Links
2. Text descriptions of the book
3. Book Cover Image

##### **iv. Connections to Other Models**

1. Housing: Displays local programs based on location
2. Affordable Childcare: Books related to childcare

#### **d. Model 2: Housing**

##### **i. Instances: ~1000**

##### **ii. Attributes**

1. Name
2. Cost/Rate
3. Rating
4. Reviews
5. Address
6. Zip Code
7. Style of Housing (Apartment, Condo, House)
8. Crime Level
9. Nearby Park
10. Transportation

##### **iii. Media**

1. Google Maps for location
2. Location Image
3. Text description

**iv. Connections to Other Models**

1. Books: Books programs pertaining to housing
2. Affordable Childcare: Displays affordable housing near the location of schools/daycares

**e. Model 3: Childcare****i. Instances: ~8000****ii. Attributes**

1. Name
2. Age Range
3. Open Time
4. Close Time
5. Program Type
6. Image
7. URL to daycare
8. Address

**iii. Media**

1. Google Maps for location
2. Image of Childcare Location
3. Link to Childcare Website

**iv. Connections to Other Models**

1. Books: Books programs pertaining to childcare
2. Housing: Affordable housing near the location of schools/daycare

#### 4. User Stories - Phase 4

- f. “Add a comprehensive list of sorting and filtering capabilities on each attribute to the technical report” - Sana Kohli
  - i. We have added filtering and sorting descriptions in this report under the API section.
- g. “Be able to jump to an arbitrary page in model view” - Sana Kohli
  - i. Done.
- h. “Customize the pagination bar at the bottom of the page to match the visuals of the website.” - Sana Kohli
  - i. Done.
- i. “State number of search results on search page for each model” - Sana Kohli
  - i. Done.
- j. “Display phone number on housing instance view” - Sana Kohli
  - i. Done.

## 5. API Documentation, Searching, and Sorting

### a. GitLab API

- i. The GitLab API enables us to display real-time data on commits, closed issues, and unit tests created by each site maintainer. We fetch issues via the [https://gitlab.com/api/v4/projects/\[PROJECT\\_ID\]/issues](https://gitlab.com/api/v4/projects/[PROJECT_ID]/issues) endpoint. For each person, we count the issues assigned to them that are currently closed. Commits are retrieved through the [https://gitlab.com/api/v4/projects/\[PROJECT\\_ID\]/repository/commits](https://gitlab.com/api/v4/projects/[PROJECT_ID]/repository/commits) endpoint, where each commit associated with a person's email address contributes to their commit count.
- ii. Since GitLab's API support for unit tests is limited, tracking the correct number of unit tests per person involves a partially manual process. Contributors include the phrase "n unit tests" in their commit messages to denote the number of tests added. Each such message increments the contributor's unit test count accordingly.
- iii. All API calls to GitLab are made asynchronously. Given GitLab's limit of 100 items per page, we repeat API calls for each subsequent page, using the page query parameter to specify the desired page of data. We set the `per_page` parameter to 100 to maximize the amount of data received per call. For example, retrieving the second page of issues would involve a request to [https://gitlab.com/api/v4/projects/\[PROJECT\\_ID\]/issues?per\\_page=100&page=2](https://gitlab.com/api/v4/projects/[PROJECT_ID]/issues?per_page=100&page=2).

### b. Google Maps API (RESTful)

- i. We have integrated Google Maps to provide location-based services and interactive maps for the Housing and Childcare models, enhancing user navigation.

### c. Google Books API (RESTful)

- i. We utilize the Google Books API to provide books related to parenting, childcare, and housing.

### d. ParentAidAtx API (RESTful)



- i. Our API utilizes GET calls to retrieve information about all models on the website, typically based on their attributes. This functionality allows users to either obtain all instances of a model at once or find a specific instance, depending on the nature of the call.
- ii. The ParentAidATX API was enhanced in phase 3 to support filtering, searching, and sorting across all model pages.

Books Filtering Options: Category, Author, Page Count, Price, Publication Year, Sort alphabetically ascending or descending

Housing Filtering Options: Zip Code, Ratings Star Range, Total Ratings, Sort alphabetically ascending or descending

Childcare Filtering Options: Type, Age, Opening Time, Closing Time, Address (alphabetically ascending or descending)

Additionally, we implemented a Google-like search using Fuse.js that supports multiple terms and highlights matching results. API endpoints allow the retrieval of related instances across Books, Housing, and Childcare models. The API improvements also included refining relationships between models by adding `related_book_id`, `related_housing_id`, and `related_childcare_id` attributes to better integrate search results.

- iii. For more detailed information, please refer to the API documentation available at <https://documenter.getpostman.com/view/42442568/2sAYdZstBy>.

## 6. Tools

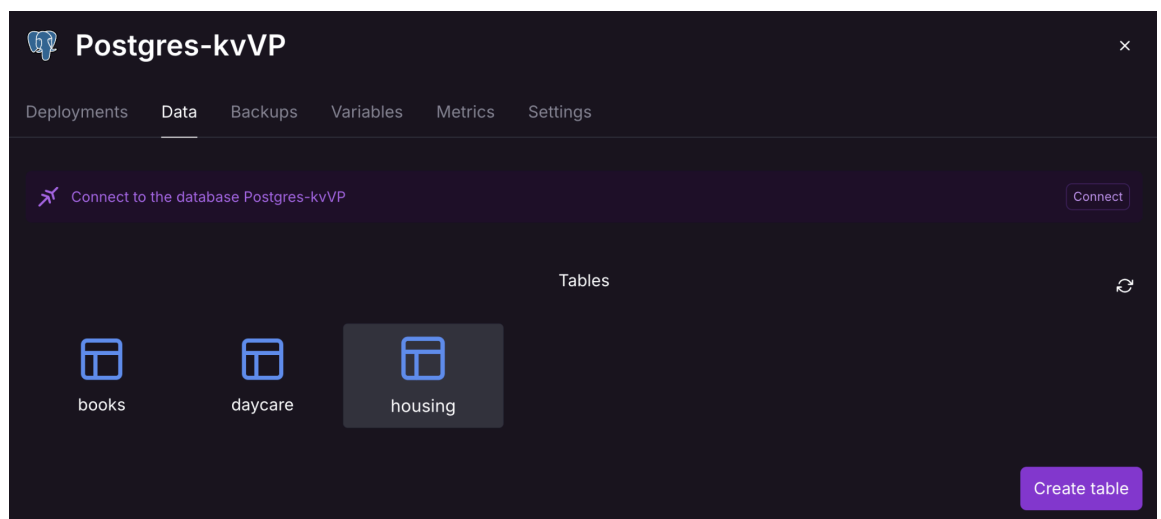
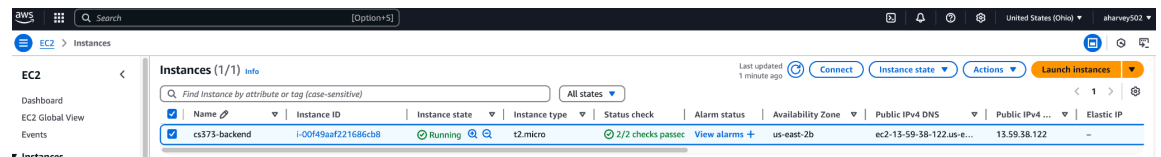
- a. **Node.js:** Used for package management. Run 'npm install' to install the required dependencies from the package.json file.
- b. **React:** Frontend framework for building user interfaces
- c. **Bootstrap:** CSS framework for responsive styling and UI components
- d. **AWS Amplify:** Website hosting
- e. **Postman:** API Documentation
- f. **Selenium:** For web scraping
- g. **Flask and Flask-CORS:** For the API endpoints
- h. **Gunicorn:** Python WSGI HTTP Server
- i. **SQLAlchemy:** To manage the database
- j. **[Railway](#):** For hosting PostgreSQL database
- k. **AWS EC2:** For hosting the backend API
- l. **D3.js:** For data visualizations

## **7. Frontend Hosting**

- a.** Our website is hosted and deployed with AWS Amplify. AWS Amplify ensures a stable user experience and allows our site to scale. Furthermore, with AWS Amplify, the website will automatically update when a push is successfully made to GitLab. The domain parentaidatx.me was obtained from Namecheap.

## 8. Backend Hosting and Database Structure

- a. The backend Flask API is hosted with AWS EC2. The backend PostgreSQL database is hosted on Railway. Within the database, there are three tables—one for each model—to hold the data we gathered, either from web scraping or using existing APIs. Our FlaskAPI endpoints then serve the data from the database to be used in our frontend. The images below show our Flask API in AWS EC2 and PostgreSQL database tables in Railway. The API is accessible at <https://api.parentaidatx.me>



## 9. Architecture

### a. System Components

#### i. Frontend

1. The frontend of ParentAidATX is built using React, HTML, CSS, JavaScript (JSX), Node.js, and Bootstrap. Each page features a navigation bar created by the App.jsx and main.jsx files. All frontend files are located in the frontend folder.

#### ii. Backend

1. The backend uses AWS EC2 to host the Flask API and Railway to host the PostgreSQL database.

#### iii. CI/CD Pipeline

1. The project is integrated with GitLab's CI/CD pipeline, allowing for continuous integration and deployment. This setup ensures that any code changes are automatically tested and deployed.

### b. Folder Structure

#### i. Frontend Folder

1. Contains all the frontend files, including the main components (App.jsx, main.jsx) that create the navigation bar.
2. **frontend/\_\_tests\_\_**: Contains the frontend tests.
3. **frontend/public**: Stores all images used in the application.
4. **frontend/src**: Stores all the models utilized by the frontend components.
5. **frontend/src/components**: Contains the Navbar component, Cards components for each page, and the pagination component.
  - a. **frontend/src/components/pagination.jsx**: Added in phase 2, this allows users to navigate through pages and displays a limited number of visible page links with ellipses for better usability.

#### ii. Backend Folder

1. **backend/app:** contains all the backend files related to our application
  - a. **api.py:** Our Flask API. Contains endpoints to serve data we gathered for each of our models.
  - b. **childcare\_scraper.py:** Web scrapes <https://mybrightwheel.com/> to get daycare (childcare) data and then inserts that data into the database “Daycare” table.
  - c. **books.py:** Utilizes the Google Books API to get books and then inserts that data into the database “Books” table.
  - d. **housing.py:** Utilizes the Google Maps API to get housing and then inserts that data into the database “Housing” table.
  - e. **Dockerfile:** Defines a containerized environment for the backend application necessary for hosting the backend in AWS EC2. When executed, it uses gunicorn to serve the API on port 5000. Ngix was then used to make it HTTPS.
  - f. **postman\_tests/:** Contains API tests.
  - g. **unit\_tests/:** Contains backend tests.

**c. Data Attributes**

- i. Each instance within the system has five attributes and includes at least two sets of media, ensuring comprehensive data representation.

**d. Data Flow**

- i. Data flows seamlessly through the system, from collection and processing on the frontend, to storage and retrieval on the backend.

**e. Communication Protocols**

- i. The system uses REST APIs for communication between the frontend and backend components, ensuring smooth data exchange and interaction.

**f. Deployment**

- i. The system is deployed and maintained using GitLab's CI/CD pipeline, enabling continuous integration and deployment. This ensures that updates and new features are rolled out seamlessly without disrupting the user experience.

## 10. Data Visualizations

- a. In phase 4, we have added the following data visualizations for both our API and our developers' API. Visualizations were created using **D3.js** within a React framework. Each visualization dynamically adapts to the dataset type—such as books, childcare services, housing options, therapists, clinics, or mental health disorders—and is rendered within reusable `VisualizationCard` components.

ParentAidATX Data Visualizations:

- **Books** are visualized using bar charts grouped by publication decade.
- **Childcare services** are illustrated with donut charts showing distribution by operating hours.
- **Housing options** are represented with smooth line charts that track the frequency of ratings.

UTherapy (Developer) Data Visualizations:

- **Therapists** are shown via pie charts reflecting interaction types (e.g., Online, In-Person, Both).
- **Clinics** are plotted using line charts to show how average ratings vary by distance range.
- **Disorders** are categorized and displayed as bar charts grouped by mental health categories.

Each chart is responsive, visually enhanced with gradients and transitions, and includes labels, legends, and tooltips to ensure readability.



## **11. Challenges**

- a. One challenge we encountered was that our customers told us that they were not able to use our API for visualizations in production because we were not allowing traffic from their URL through CORS. We fixed this by adding their URL to CORS and also allowing traffic from anywhere else, in case anyone else would like to use our API for visualizations.