ParentAidATX Phase 3 Technical Report

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Website Link: https://parentaidatx.me

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1. **Phase 3 Overview**
    a. In this phase, we focused on enhancing the search and filtering capabilities of ParentAidATX to improve usability and accessibility. We implemented a Google-like search that supports multi-term queries and highlights search terms in results, allowing users to find relevant information more efficiently. Additionally, we introduced filtering, searching, and sorting to all model pages, enabling users to refine their searches based on key attributes such as cost, rating, and location. To support these enhancements, we refined our RESTful API endpoints and conducted extensive unit testing using Postman for the backend (Flask/PyTest) and Mocha/Jest for the frontend. We also improved GUI acceptance tests using Selenium to validate the user experience. Furthermore, we refined the data structure and instance relationships to better integrate Books, Housing, and Childcare, ensuring a more seamless and intuitive navigation experience for users.

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 3**
    f. “Add filtering by page count, so, for example, someone can only find books that are less than 300 pages” - Sana Kohli
        i. On the books page, we offer a 'filter by' option, allowing users to specify a minimum and maximum page count to refine their search.
    g. “Add filtering for apartments by zip code so people can find an apartment in their desired area” - Sana Kohli
        i. On the housing page, we offer a 'filter by' option that includes zip code as a parameter, enabling users to refine their search accordingly.
    h. “Format the operating hours on Apartments nicely” - Sana Kohli
        i. When users click on an individual apartment, there is a dedicated section displaying the operating hours. This section is accompanied by a thoughtfully designed icon, enhancing the aesthetics and providing a pleasing visual experience.
    i. “Allow filtering by opening and closing hours on certain days for Housing” - Sana Kohli
        i. We discussed the request to allow filtering by opening and closing hours for Housing and realized that it is not feasible. The hours are displayed on the instance page but not included on the summary cards, meaning they cannot be used as filter criteria. After speaking with the customer, we confirmed that this limitation is acceptable.
    j. “Allow sorting by rating for Housing in both ascending and descending order” - Sana Kohli
        i. On the housing page, under the 'filter by' section, there's a 'sort by' dropdown menu that includes a ratings option. Next to this, an additional dropdown menu allows users to choose between ascending or descending order for their selection.

5. **API Documentation**
   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 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 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.

   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. **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 this phase to support filtering, searching, and sorting across all model pages. Additionally, we implemented a Google-like search that supports multiple terms and highlights matching results. New API endpoints now allow 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.

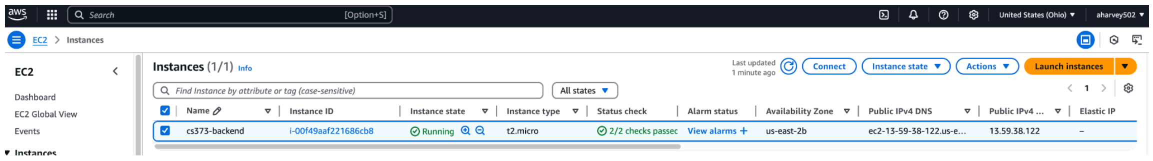
iii. For more detailed information, please refer to the API documentation available at https://documenter.getpostman.com/view/42442568/2sAYdZstBv.

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

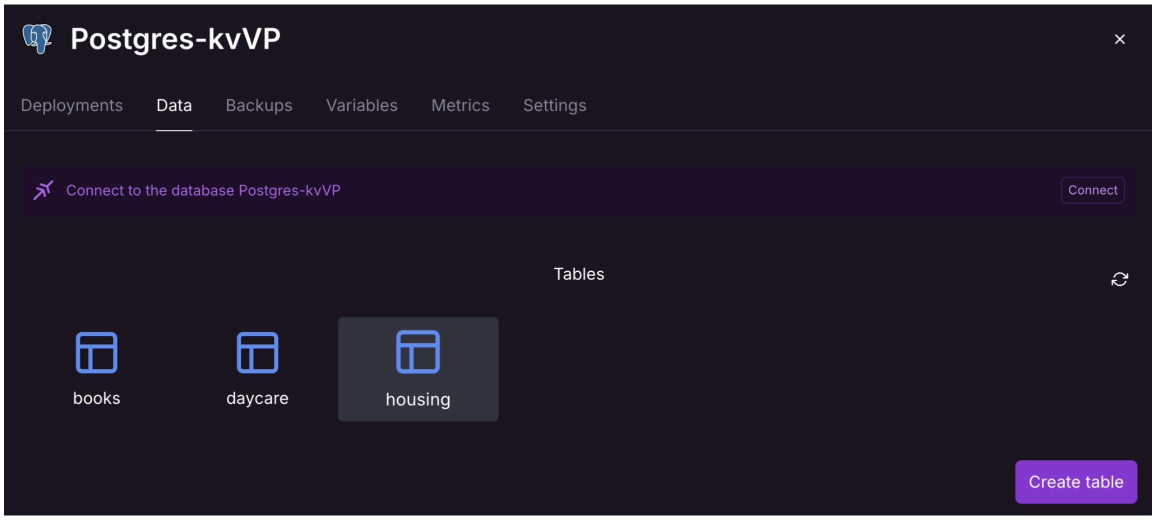
7. **Frontend Hosting**
    a. Our website is hosted and deployed with AWS Amplify. AWS Amplify ensures a stable user experience and allows our site to scale. Furthermore, with AWS Amplify, the website will automatically update when a push is successfully made to GitLab. The domain parentaidatx.me was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



Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP
cs373-backend	i-00f49aaf221686cb8	Running	t2.micro	2/2 checks passec	View alarms +	us-east-2b	ec2-13-59-38-122.us-e...	13.59.38.122	–



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. Challenges

a. We had some challenges with bugs in the API endpoints, specifically ensuring that each of the tables was connected with one another via foreign keys. One issue we ran into here was the our API became out of sync with our database at one point, which was an issue because some of our backend code was using stale IDs from the API response, while the new IDs were in the database. We fixed this by syncing the API using a Docker image ran in the AWS EC2 Instance.

b. Another challenge was implementing fuzzy searching, it took some tuning using fuse.js, but we got the searching functionality to the point we wanted. It's Google-like, and still works well with typos. We had to adjust the "fuzzy-ness" parameter to get the search a little more specific. We also had to sort the search results to order them logically.