**Hackathon to Open Source Contribution: Expanding Bloom Housing for Unhoused Populations**

### **Overview: AI for Equitable Housing Access**

This multi-stage innovation challenge invites participants to develop technology-driven solutions that enhance Bloom Housing to better serve unhoused populations. The project focuses on integrating artificial intelligence (AI) and accessibility features to improve housing searchability, streamline application processes, and ensure reliable access even in low-connectivity environments. Participants wilah,l develop a solution that extends Bloom Housing’s open-source platform, contributing to a more equitable housing system.

### **Problem Statement: AI-Enhanced Housing Support**

Bloom Housing is a leading open-source platform that centralizes affordable housing opportunities, yet unhoused individuals often face significant barriers in accessing and applying for housing due to digital literacy challenges, lack of continuous internet access, and complex application requirements.

Your mission is to develop AI-powered features that remove these barriers and improve the user experience for unhoused individuals, making housing access more efficient, intuitive, and equitable.

### **Real-World Challenge:**

Develop a solution that addresses at least one of the following key challenges for unhoused individuals:

#### **Frontline Housing Helper**

**Problem:** Limited experts and high demand creates misinformation, distrust and confusion for unhoused home seekers.

**Persona(s):** Frontline workers without formal/training in affordable housing.

**Data:**

* + Listings
  + Residents selection criteria documents
  + Ordinances on local preference policies
  + Government websites
  + Rental assistances information from non-profit agencies
  + AMI charts
  + Official FAQs

**Challenge:** Develop a chatbot that helps frontline workers support affordable housing seekers by providing them with tailored, reliable, actionable and simplified information.

#### **Improved Language Accessibility**

**Problem:** Information valuable to home seekers, such as eligibility criteria and resources to help them prepare for the application process can be difficult to understand.

**Persona(s):** Jurisdictional staff and housing developers seeking to simplify text presented to home seekers.

**Data:**

* + Residents selection criteria documents
  + Ordinances on local preference policies
  + Rental assistances information on Bloom Housing and from non-profit agencies
  + FAQs

**Challenge:** Develop an AI-powered tool that helps housing staff simplify text so that it is easy to understand.

#### **Conversational Housing Application Problem:** Home seekers looking for support in the housing application process often have difficulty navigating the process.

**Persona(s):** Prospective housing applicants looking for housing supported by housing programs.

**Data:**

* + Listings and attached preferences and programs
  + Housing and Community Development (HCD) housing programs
  + Local Continuum of Care (CoC) housing assistance programs
  + Residents selection criteria documents
  + Ordinances on local preference policies

**Challenge:** Develop an AI-based conversational assistant that helps the applicant through the process by asking questions, sharing resources, and suggesting programs to apply for. The assistant can also guide the applicant through the application process after they have selected a program.

#### **Detect Risk of Becoming Unhoused Problem:** According to the [National Alliance to End Homelessness](https://endhomelessness.org/state-of-homelessness/), the number of people experiencing homelessness is increasing year-over-year and historically, most people who become unhoused, are doing so for the first time. Home seekers may not realize their own risk of becoming unhoused.

**Persona(s):** Applicants who may be at risk of homelessness.

**Data:**

* + Anonymized and structured applicant data:
    - Demographics (e.g. age, gender, household size)
    - Income/employment status
  + Local Continuum of Care (CoC) data (e.g. <https://homelessness.acgov.org/data_homeless_response.page>)
  + [HUD Annual Homeless Assessment Report (AHAR)](https://www.hudexchange.info/homelessness-assistance/ahar/#2024-reports)
  + [US Census Data](https://data.census.gov)
  + Other open data provided by government agencies and non-profit organizations

**Challenge:** Develop a machine learning solution that analyzes structured data to predict the risk of an applicant being unhoused, without requiring sensitive free-text inputs or LLMs.

### **Provided Resources**

[Bloom Housing](https://github.com/bloom-housing)’s open-source repositories will provide a starting framework for you to address these challenges. Exygy volunteers will provide an introduction and overview of the codebase to help get you started.

* **Tech Stack:** [Bloom Housing](https://github.com/bloom-housing/bloom) utilizes TypeScript across the stack
  + **Backend:** [Nest.js](http://nest.js) (a Node.js framework) with [Prisma ORM](https://www.prisma.io/orm) tied to a Postgres database
  + **Frontend:** [Next.js](http://next.js) (a React framework) using [Seeds](https://github.com/bloom-housing/ui-seeds), a component library for Bloom Housing
* **Seed Data:** [Bloom’s backend](https://github.com/bloom-housing/bloom/tree/main/api) provides seed data that generates mock data that can be used for experimentation and generating datasets for training LLMs. By following the setup instructions for [getting started locally](https://github.com/bloom-housing/bloom/blob/main/api/README.md#starting-locally), an initial seed will be generated.
* **Documentation:**
  + Bloom’s main [README](https://github.com/bloom-housing/bloom) provides an overview of the platform and information on how to get started and contribute.
  + [AI + Data Ethics Guided Introduction](https://docs.google.com/document/d/1EOEaXcmCs-2QFjp7Fe79p0o1kZJZrpC68IfRmvnqONc/)
  + [A framework](https://exygy.notion.site/13c3433f03d080ea95d9c11506344ae7?v=13c3433f03d080ba8ca7000c9fc254ba) we use for developing AI responsibly, which includes our principals, guardrails and checklists
  + [Bloom Housing Guide](https://www.notion.so/exygy/Bloom-Housing-Public-Partners-Guide-A-Work-in-Progress-e0b29ba721a6405981713846aa397df3)
* **Mentorship Sessions:** Provide mentorship on Bloom’s tech stack, implementing new features, preparing data for responsible and ethical use with LLMs and evaluating use cases and implementation of models.
* **Python-based AI Solutions:** The open-source Bloom Housing platform does not yet have core support for AI solutions. Using the expertise you have gained through the JTC program, the Bloom team encourages you to develop Python-based micro services to implement AI solutions using open-source machine learning libraries like TensoFlow.
* **Integrating AI Services with Bloom Housing:** The Bloom team recommends integrating AI solutions via an API with the Bloom Housing platform by developing [Nest.js modules](https://docs.nestjs.com/modules) and their corresponding controllers and services. You may find [existing module definitions here](https://github.com/bloom-housing/bloom/tree/main/api/src/modules).
* **Developing with LLM Models:** Our team uses [LM Studio](https://lmstudio.ai/) to develop locally with LLMs. This can also help keep costs low with training and inference and allows you to test a variety of models.
  + **Open-source:** As Bloom is an open-source project, we encourage you to use open-source LLMs like [Gemma](https://ai.google.dev/gemma) and [Llama](https://www.llama.com/)

### **Responsible AI Considerations**

While AI can provide significant benefits, it's crucial to implement it responsibly:

* **Bias Mitigation:** Ensure training data for recommendations and chatbot assistance is diverse and representative to avoid reinforcing biases in housing recommendations.
* **Transparency:** Clearly communicate when AI is making a decision or recommendation, allowing users to understand and override AI-driven suggestions if needed.
* **Privacy & Security:** Implement on-device processing for sensitive tasks where possible (e.g. scanning IDs for autofill) to reduce data exposure.
* **Accessibility:** Design AI features to be multimodal, including text, voice, and visual interfaces, to support users with varying literacy levels or disabilities.

### **Data Considerations**

* **PII Retention**: Retention timelines are dependent on jurisdiction requirements, and should be configurable. Jurisdiction configurations can be stored directly on the Jurisdictions table or via a related table.
* **PII in Development:** You should not need access to production PII during development. If you find that the mock data generated by the system will not meet your requirements, we will assist you in creating mock data that more closely simulates PII found in production.
* **Data Anonymization:** User data should be anonymized such that no collection of data points can be used to identify a user. For example, if your use case requires geographic data of where users live or work paired with their monthly income, the anonymized data cannot contain a census tract with a specific monthly income, as that data could be used to identify a user or household.
* **Data Hosting Restrictions:** There are currently no geographical restrictions. Considerations for data hosting should be relatively cloud platform agnostic. Bloom Housing currently supports Heroku and AWS environments.

### **The Bloom Housing Open Source Connection**

Bloom Housing is built and maintained as an open-source initiative, welcoming contributions that:

* Improve accessibility and usability for vulnerable populations.
* Enhance mobile and offline capabilities.
* Integrate AI features that prioritize ethical, transparent, and fair recommendations.
* Support housing advocacy through technology-driven solutions.

Your final solution should contribute new AI-driven enhancements to Bloom Housing’s codebase, ensuring long-term impact within the open-source ecosystem.

**Contributing to Bloom Housing**

* **Create a Fork:** For this challenge, the Bloom team would like you to create a fork of the [main Bloom repository](https://github.com/bloom-housing/bloom).
* **Branching:** Branches should focus on a single task or concern. This will also help keep PRs as small as possible and easier for our team to review.
* **Commits:** Bloom uses [conventional commits](https://www.conventionalcommits.org/en/v1.0.0/#summary), which are enforced when you create a commit. We recommend you be intentional about your commits and break them up into separation of concerns.
* **PRs:** Bloom utilizes a PR template to help contributors provide information necessary information to reviewers. This includes the issue a PR addresses (we encourage you to create issues on your fork to help guide your work before you start), a description of the PR, how it can be tested and reviewed and a checklist to guide your self review of your contribution.