CS3200: Introduction to Databases
Semester 2

OAKhoury Trees

Devan Kumar, Jordan Pinnick, Matthew Shi

04/21/2025

Abstract:

The problem is that OAKhoury right now uses a Google Form in order to keep track of all of its data. This causes issues as it is extremely inefficient to try to track volunteers and users who submit a tree request. Some of the users who submit tree requests may not want to be volunteers. Organization members may find this very time consuming for trying to read data that tends to be all over the place due to the amount of variables such as tree type, neighborhood, or volunteer status to be different. Developing a web application allows us to present a powerful tool that resolves any tracking issues between the users.

We decided to create a web application that allows for residents to be able to register as a user. As a user, residents are able to place a request for a tree. The tree request details may be viewed by any of the users. These tree requests may be approved by an administrator which are organization members. The administrator consists of an admin dashboard that allows them to view pending tree requests. The residents that are not organization members are able to volunteer themselves to help with the planting once the tree request is approved. Administrators are able to approve people to become volunteers. Administrators are also able to run query reports in order to find specific conditions.

Through replacing the outdated Google Form, OAKhoury is able to use a powerful tool to grow their community and be able to build a more environmentally friendly environment.

Description:

We are developing a database and application for the Trees for Oakland nonprofit organization. Residents will be allowed to register on the app by providing their first name, last name, email, street, zip code, and a password for their account. A resident is also part of a neighborhood where trees can be planted within that neighborhood.

Trees contain a: name, scientific name, minimum height, maximum height, minimum width, maximum width, minimum planting bed width, the ability to be planted under power lines, their nativity to California, their drought tolerance, growth rate, foliage type, debris, root damage potential, nursery availability, visual attraction, harsh sites, bay, urbanization, if they are near natural areas, and the amount of inventory that the organization are able to plant. These trees may be planted through tree requests made from registered users. Tree requests consist of a submission timestamp on when the request was made, a description of the site, an approval status for the request, the street and zip code the request is assigned at. However, a tree request also requires a permit which consists of a status for approval and a decision date. Permits are applied for by residents.

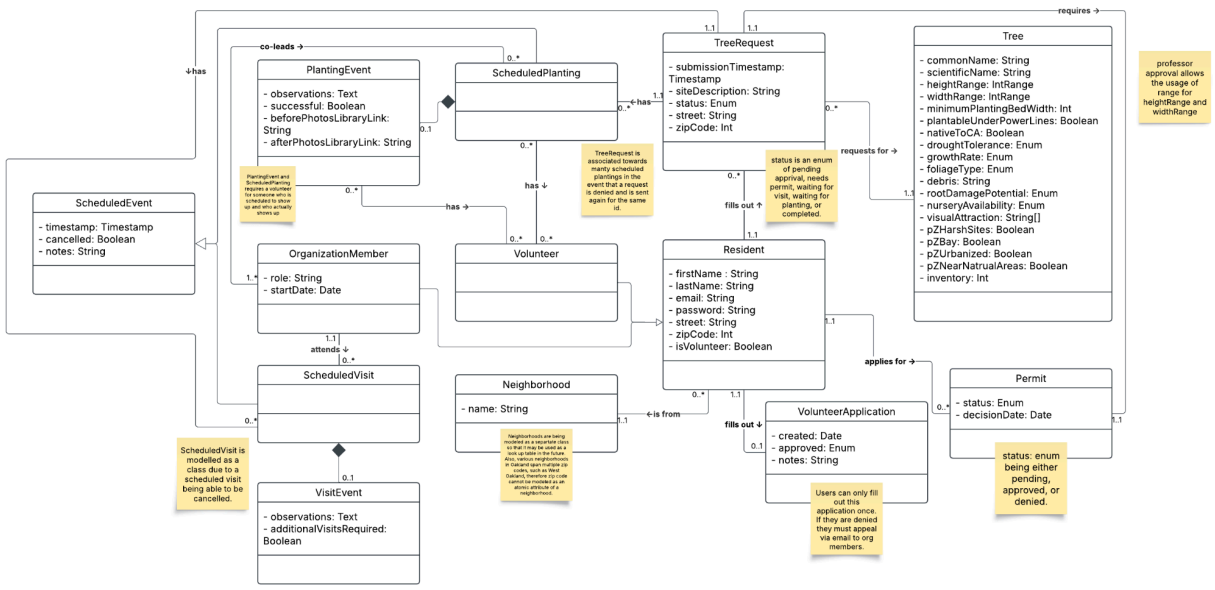
Residential users are also able to fill out a volunteer application to assist in the planting of a tree. These applications contain a creation date for the applicant, an approval status, and additional notes on the application. These users can only fill this application out once and if they are denied, they must appeal via email to the organization members. Organization members are also users (who inherited the attributes of residents) with a role assigned to them and a start date. If

the application is approved, the user is able to become a volunteer (which inherits the attributes from a resident) and participate with events.

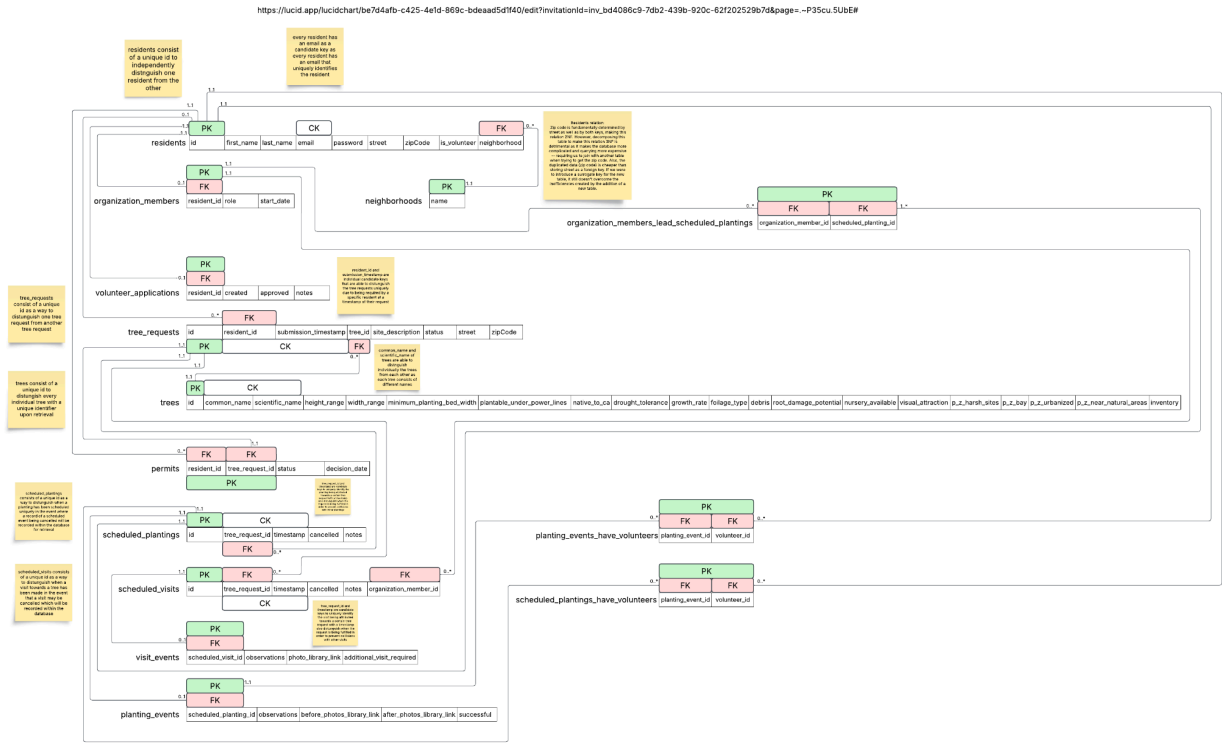
If the tree request is approved, a scheduled planting and scheduled visit are created (both inheriting a scheduled event which contains a timestamp, cancellation status, and additional notes). A scheduled planting has volunteers to help assist the event and is led by an organization member. The planting event (composing the scheduled planting) contains observations, whether or not there needs to be additional planting, and links to photos for the before and after stage. Organization members are part of the planting event due to the fact that one organization member must be assigned during the scheduled planting and is required to attend the actual event. It also contains volunteers that are there to assist the planting. Visiting the event (composing of the scheduled visit) contains additional details on the observations and whether or not additional visits are required.

UML Class Diagram:

https://lucid.app/lucidchart/be7d4afb-c425-4e1d-869c-bdeaad5d1f40/edit?invitationId=inv_bd4086c9-7db2-439b-920c-62f202529b7d&page=E283~sCDk0F9#



RDB Scheme Diagram



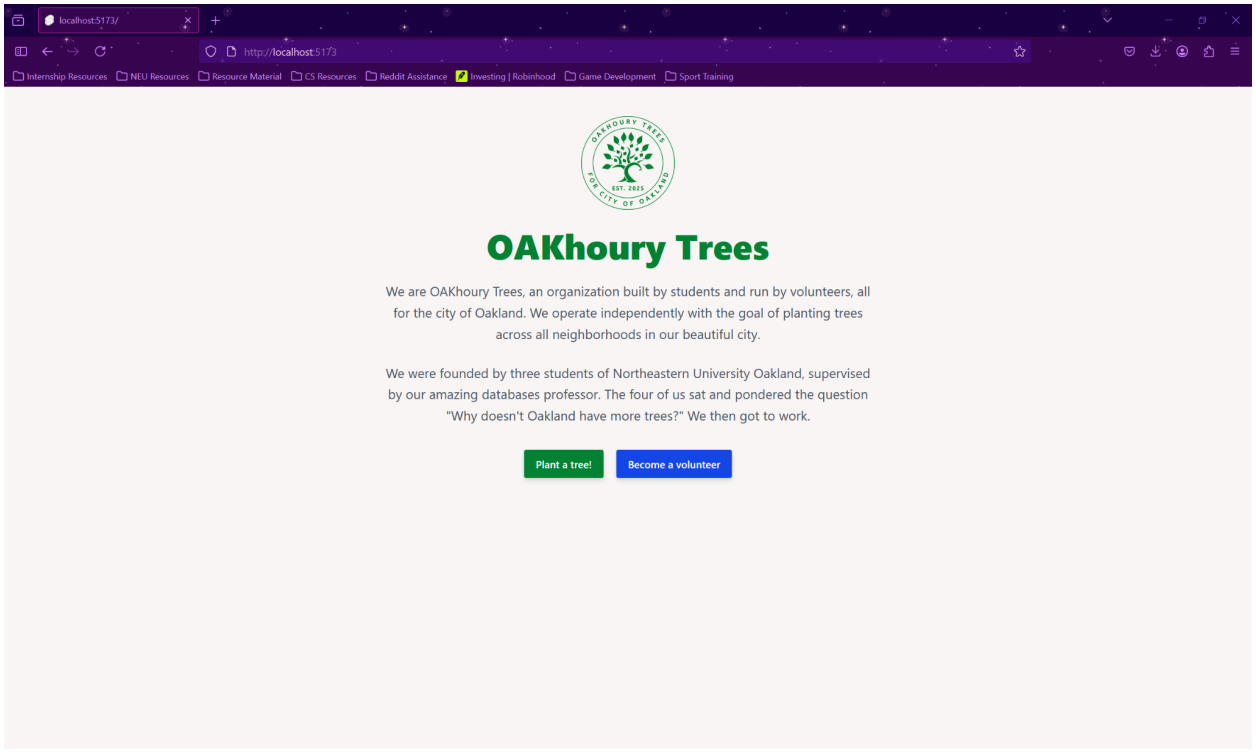
Normalized relations

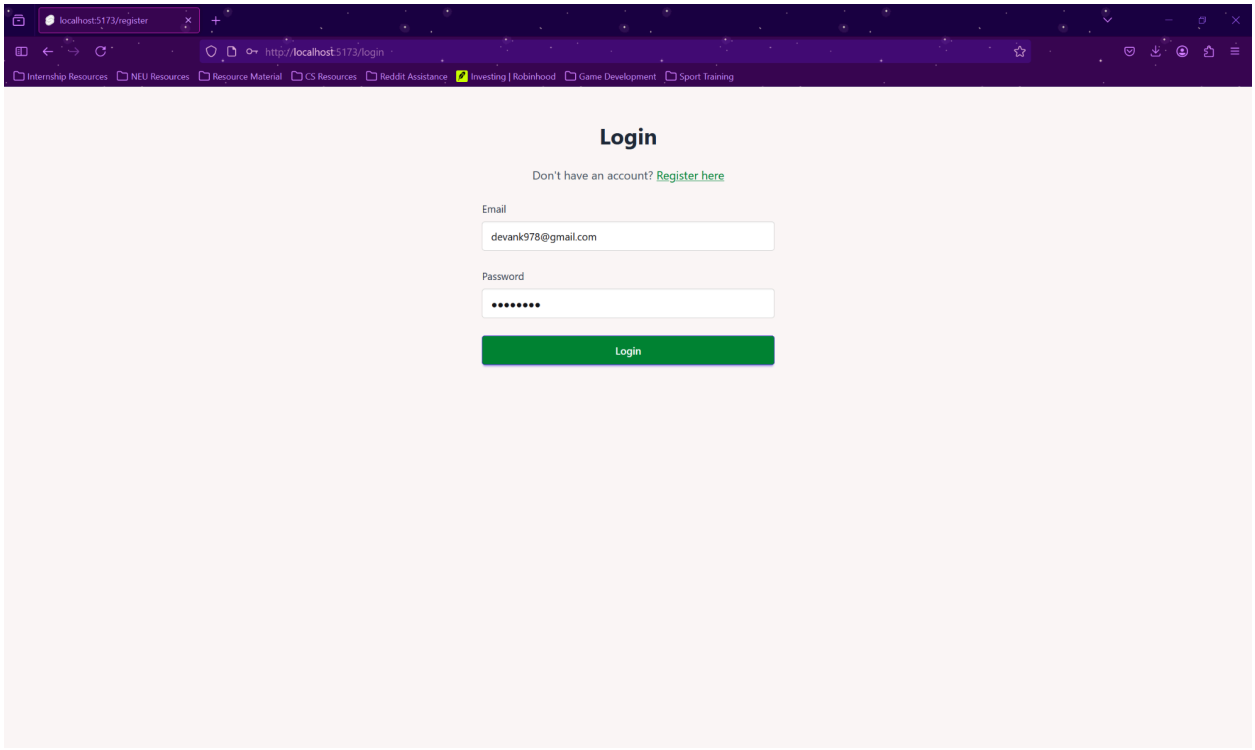
Residents relation: Zip code is fundamentally determined by street as well as by both keys, making this relation 2NF. However, decomposing this table to make this relation 3NF is detrimental as it makes the database more complicated and querying more expensive -- requiring us to join with another table when trying to get the zip code. Also, the duplicated data (zip code) is cheaper than storing street as a foreign key. If we were to introduce a surrogate key for the new table, it still doesn't overcome the inefficiencies created by the addition of a new table.

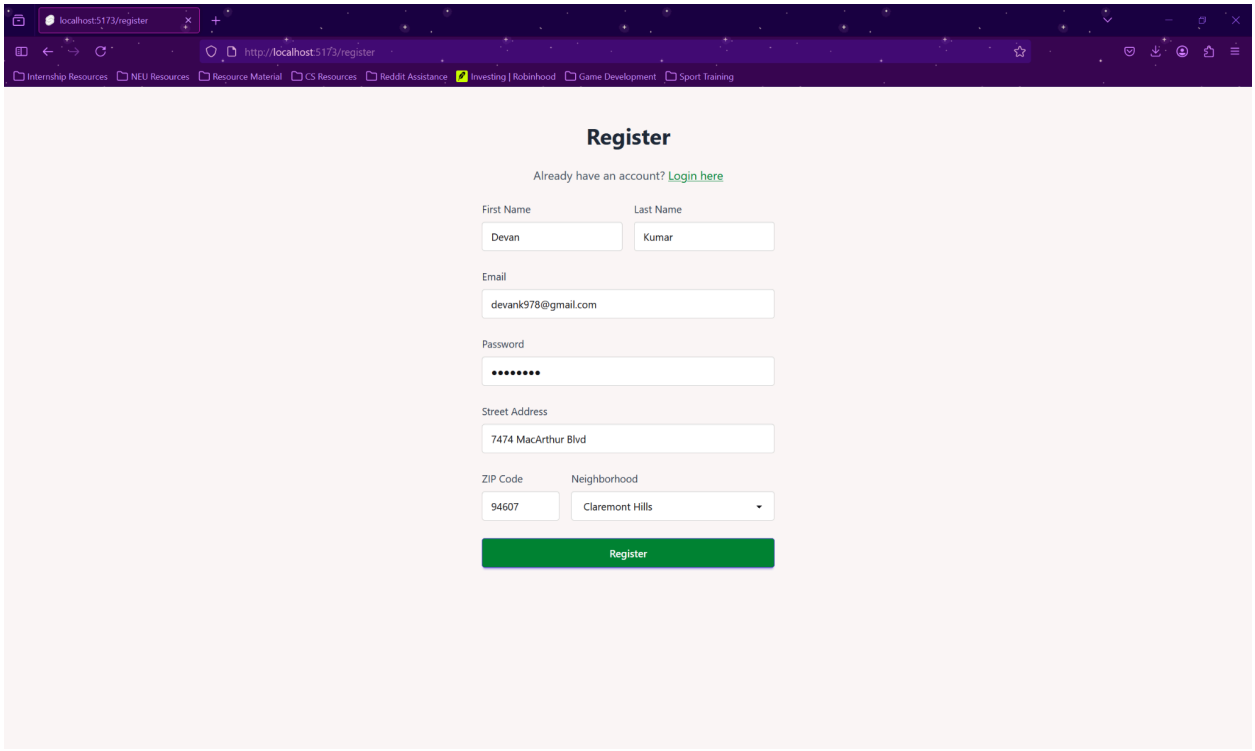
Trees relation: Visual attraction is a very ambiguous attribute that would require another table to be in 3NF, however due to the ambiguous nature of this attribute we did not know how to fully enclose the domain of this attribute without creating data that contained a lot of null

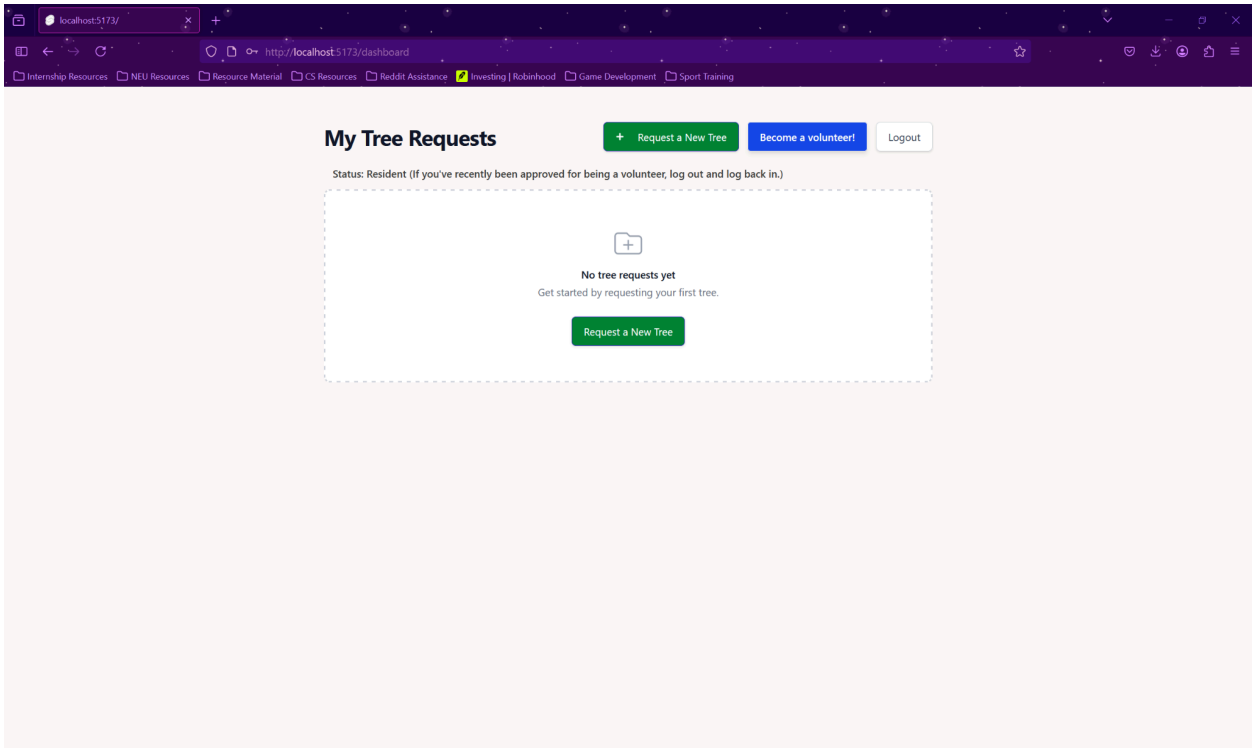
values. Due to the numerous null values that were to be created, we believe that avoiding them through the use of a String array was the best way of going about this problem.

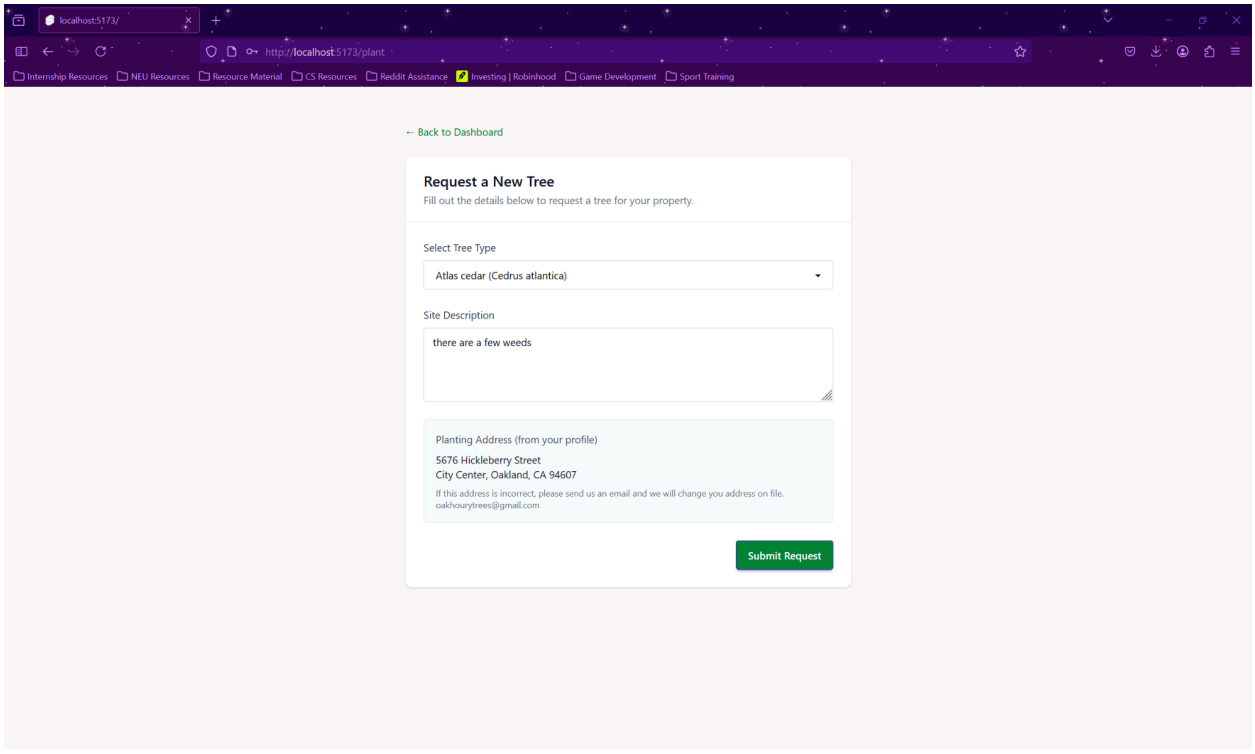
Screenshots

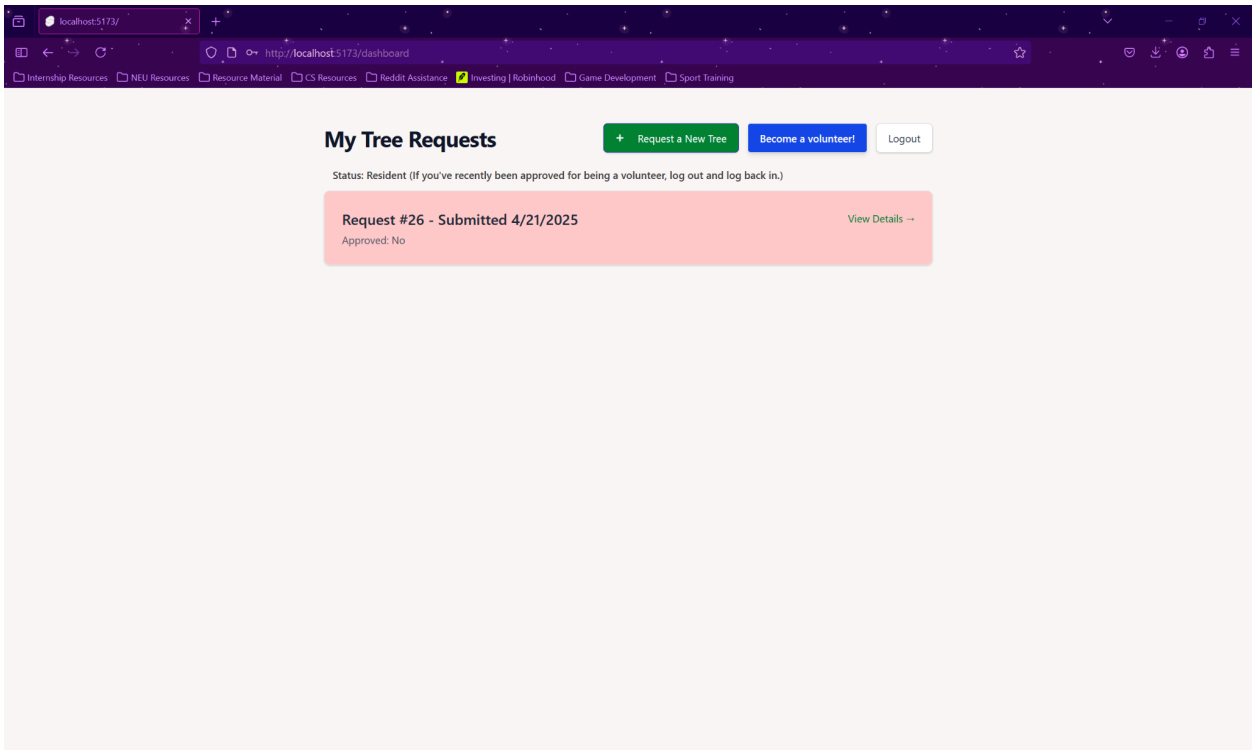


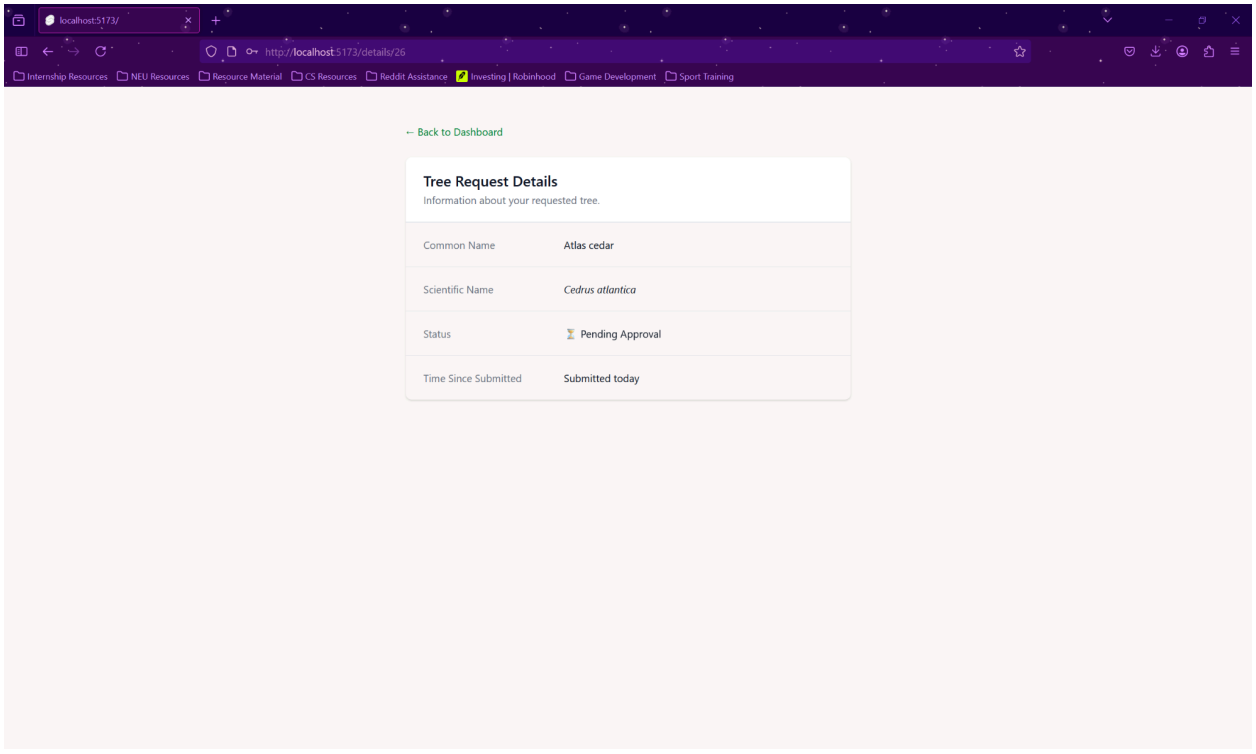

localhost:5173/register
http://localhost:5173/login
Internship Resources
NEU Resources
Resource Material
CS Resources
Reddit Assistance
Investing | Robinhood
Game Development
Sport Training
Login
Don't have an account? Register here
Email
devank978@gmail.com
Password
Login


localhost:5173/register
http://localhost:5173/register
Internship Resources
NEU Resources
Resource Material
CS Resources
Reddit Assistance
Investing | Robinhood
Game Development
Sport Training
Register
Already have an account? Login here
First Name
Devan
Last Name
Kumar
Email
devank978@gmail.com
Password
Street Address
7474 MacArthur Blvd
ZIP Code
94607
Neighborhood
Claremont Hills
Register


localhost:5173/
http://localhost:5173/dashboard
Internship Resources
NEU Resources
Resource Material
CS Resources
Reddit Assistance
Investing | Robinhood
Game Development
Sport Training
My Tree Requests
+ Request a New Tree
Become a volunteer!
Logout
Status: Resident (If you've recently been approved for being a volunteer, log out and log back in.)
No tree requests yet
Get started by requesting your first tree.
Request a New Tree


localhost:5173/
http://localhost:5173/plant
Internship Resources
NEU Resources
Resource Material
CS Resources
Reddit Assistance
Investing | Robinhood
Game Development
Sport Training
← Back to Dashboard
Request a New Tree
Fill out the details below to request a tree for your property.
Select Tree Type
Atlas cedar (Cedrus atlantica)
Site Description
there are a few weeds
Planting Address (from your profile)
5676 Hickleberry Street
City Center, Oakland, CA 94607
If this address is incorrect, please send us an email and we will change you address on file.
oakhourytrees@gmail.com
Submit Request


localhost:5173/
http://localhost:5173/dashboard
Internship Resources
NEU Resources
Resource Material
CS Resources
Reddit Assistance
Investing | Robinhood
Game Development
Sport Training
My Tree Requests
+ Request a New Tree
Become a volunteer!
Logout
Status: Resident (If you've recently been approved for being a volunteer, log out and log back in.)
Request #26 - Submitted 4/21/2025
Approved: No
View Details →


localhost:5173/
http://localhost:5173/details/26
Internship Resources
NEU Resources
Resource Material
CS Resources
Reddit Assistance
Investing | Robinhood
Game Development
Sport Training
← Back to Dashboard
Tree Request Details
Information about your requested tree.
Common Name
Atlas cedar
Scientific Name
Cedrus atlantica
Status
Pending Approval
Time Since Submitted
Submitted today

← Back to Dashboard

Tree Request Details - ID: 17

Request Information

Tree Species
King palm (*Achontophoenix cunninghamiana*)

Current Inventory
0

Resident Address
901 Jefferson Street, Old Oakland, 94607

Status
waiting for planting

Site Description / Notes
Contains large area for planting

Actions

Schedule Visit | Schedule Planting

Scheduled Visits

Visit ID	DATE/TIME	STATUS	ORG MEMBER ID	NOTES	ACTIONS
26	8/22/2024, 11:00:00 PM	Completed	13	N/A	*Outcome record*

Scheduled Plantings

PLANTING ID	DATE/TIME	STATUS	NOTES
36	4/21/2025, 4:50:00 PM	Scheduled	f

← Back to Request Details (ID: 17)

Manage Planting Event - ID: 36

Event Details

Date & Time
4/21/2025, 4:50:00 PM

Status
Scheduled

Planting Notes
f

Original Request Site Description
Contains large area for planting

Assignments & Actions

Assigned Volunteers

- Holden Schmitt

Assign New Volunteer

Assign

Assigned Org Members (Leads)

No organization members assigned yet.

Assign New Org Member

Assign

Record Planting Outcome

Planting Successful?

Observations / Notes (Optional)

Enter any notes about the planting event, site conditions, resident interaction, etc.

Attended Volunteers

Holden Schmitt

Record Planting Outcome

← Back to Dashboard

Approve Volunteers

No pending volunteer applications

All applications have been reviewed.

← Back

Become a Volunteer!

Help grow Oakland's urban canopy! Our volunteers are crucial for planting events, site assessments, and community outreach. No experience necessary, just a willingness to help make Oakland greener.

Submit this form to express your interest. Feel free to add any notes about your availability, specific interests (planting, outreach, etc.), or questions you might have.

Thank you for expressing interest in volunteering!

Notes (Optional)

Let us know your availability, interests, or any questions...

Submit Volunteer Interest

← Back to Dashboard

Approve Volunteers

NAME	EMAIL	DATE SUBMITTED	NOTES	ACTION
f f	test@gmail.com	4/21/2025	I want to be a volunteer please! I have a car and can drive pretty far.	Approve

Admin Dashboard

Approve Volunteers

Pending Tree Requests

Review and manage requests awaiting action.

REQUEST ID	STATUS	DATE SUBMITTED	ACTIONS
26	completed	4/21/2025	Details
17	waiting for planting	2/15/2025	Details
16	needs permit	2/7/2025	Details
13	waiting for planting	1/1/2025	Details
7	completed	1/1/2025	Details
3	completed	12/8/2024	Details
11	completed	11/11/2024	Details
10	completed	10/3/2024	Details
15	completed	9/15/2024	Details
2	completed	8/31/2024	Details
14	completed	7/10/2024	Details

← Back to Dashboard

Tree Request Details - ID: 26

Request Information

Tree Species
Cajeput tree (*Melaleuca quinquenervia*)

Current Inventory
0

Resident Address
5000 MacArthur Blvd, Mills College, 94613

Status
completed

Site Description / Notes
d

Actions

Schedule Visit | Schedule Planting

Scheduled Visits

Visit ID	DATE/TIME	STATUS	ORG MEMBER ID	NOTES	ACTIONS
39	4/22/2025, 5:02:00 PM	Completed	1	katie	*Outcome record*

Scheduled Plantings

PLANTING ID	DATE/TIME	STATUS	NOTES
40	4/23/2025, 5:03:00 PM	Completed	front of yard!

← Back to Admin Dashboard

Run Query Reports

Select Query Report

Task 1: Pending Requests Status & Age

Run Query

Results for: Task 1: Pending Requests Status & Age

DAYS SINCE SUBMISSION	ID	STATUS
293	1	denied
294	6	waiting for planting
304	8	denied
375	9	denied
111	13	waiting for planting
73	16	needs permit
66	17	waiting for planting
435	18	waiting for planting
343	19	waiting for planting

← Back to Admin Dashboard

Run Query Reports

Select Query Report

Task 2: Trees Planted by Neighborhood

Neighborhood

Mills College

Run Query

Results for: Task 2: Trees Planted by Neighborhood

COMMON NAME	NUMBER OF TREES
Cajeput tree	3

← Back to Admin Dashboard

Run Query Reports

Select Query Report

Task 3: Tree Species Statistics

Run Query

Results for: Task 3: Tree Species Statistics

COMMON NAME	NUM PLANTED IN PEAK YEAR	NUMBER OF TREES PLANTED	YEAR MOST PLANTED	YEARS SINCE PLANTIN
Cajeput tree	3	3	2025	0
Marina madrone	1	1	2024	1
Cork oak	1	1	2025	0
Catalina cherry	1	1	2025	0
Compton oak	1	1	2024	1
Chisos red oak	2	3	2025	0
Fastigate blue atlas cedar	1	1	2024	1
African fern pine	1	1	2025	0

← Back to Admin Dashboard

Run Query Reports

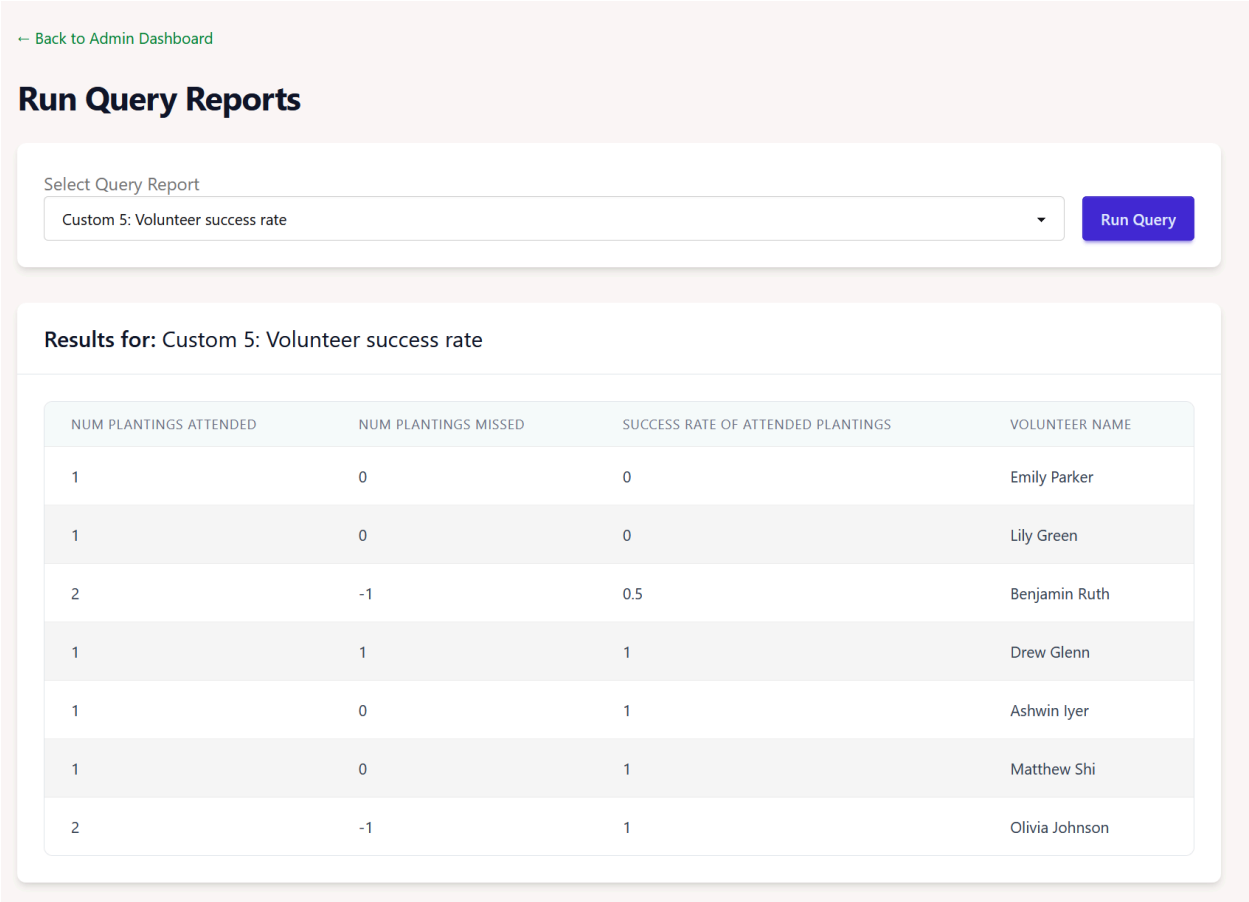
Select Query Report

Task 4: Neighborhood Report

Run Query

Results for: Task 4: Neighborhood Report

NEIGHBORHOOD NAME	NUM OF COMPLETED REQUESTS	NUM OF DENIED REQUESTS	NUM OF PLANTED TREES	NUM OF REQUESTS
Caballo Hills	1	0	1	1
Castlemont	0	0	0	1
Clawson	0	1	0	2
Crocker Highlands	1	0	1	1
Eastmont Hills	4	0	1	4
Glenview	0	0	0	2
Ivy Hill	0	0	0	1
Lockwood-Tevis	1	0	1	1
Longfellow	0	0	0	3



Project Retrospective

The creation of the UML and the RDB schema were our favorite parts of the project. To be able to design our own version of our interpretation towards the project narrative allowed us to have a perspective on not only the project but each other's interpretation as well. This allowed for effective collaboration towards our approach towards the project. The parts we disliked the most were implementing the complex queries and the DML in correspondence towards the complex queries. The complex queries we found challenging to find a balance between the function having a practical use towards our GUI as well as making sure it wasn't so complex that it would just be used for one practical purpose. The DML also provided a small setback as sometimes the data may be inaccurate without us testing our reports.sql and task.sql, leaving for changes that sometimes were petty as we had to find minor errors with the DML. We learned how to develop

a database model and relationships and be able to use the model and relationship in order to develop our own SQL code, finally leading us on creating a frontend application on how the code would work in the backend. It was an interesting experience exploring the backend side of applications.

Conclusion Statement

We developed our own UML and RDB interpretation towards the project. After developing the diagrams, we created SQL code with the creation of tables, input data into the tables, basic query functions, and complex query functions. We then produced a web application GUI that utilizes our database in order to allow users to have more effective functions. The only thing that needs to be done is to bring one of the tables to 1NF as it is currently in a String array.

Devan Kumar’s Contributions

- Relational Model
- Normalization
- Report Queries
    - Task 1
    - Task 2
    - Task 3
    - Task 4
    - Task 5
- Milestone Corrections
    - Task Queries
        - Task 4

Jordan Pinnick’s Contributions

- Prototype UML Design
- Complete UML
- DDL
- Tasks Queries
    - Task 1
    - Task 2
    - Task 3
- Report Queries Ideas
    - Task 5
- Web Application

Matthew Shi's Contributions

- Prototype UML Design
- DML
- Task Queries
    - Task 4
- Report Queries Ideas
    - Task 4
- Milestone Corrections
    - DML
- Project Report
- Presentation