CS5200 Final Project

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Project Motivation

This project is to design and implement a database and application for the team OAKhoury Trees who is working with the non-profit organization Trees for Oakland contributing to the urban forest in Oakland by planting and maintaining trees.

The solutions are delivered by developing an application which allows residents to submit requests of planting a tree, volunteers to sign up, and an administration team to process the requests, schedule the site visit and recommend a tree by checking tree inventory and planting requirements, and schedule the tree planting event with volunteers.

System Description

The system is designed with the following functionalities:

- Registered new users: volunteers, residents and admin.
- Processed tree requests, including collecting the planting address, planting permit status.
- Scheduled site visits for tree requests and assigned admin member.
- Recorded site visit details, including photos for team review.
- Scheduled tree planting and assigned volunteer teams.
- Documented volunteer participation, site observations, and before/after photos after planting.
- Updated the available tree species list by adding or removing species.
- Displayed the status and age of all pending or in-progress tree requests.
- Enabled filtering to find trees planted in selected Oakland neighborhoods or zip codes.
- Provided species specific report, including:
  Total trees planted per species,
  Years since the first and most recent planting,
  The peak year and total for most trees planted.
- Generated neighborhood level reports summarizing:
  Tree request statuses (submitted, approved, rejected),
  trees species and amount planted

System Description: Additional Functionality

- Design the logic of recommending a tree to planting site: reviewed the site visit process and criterias of recommending trees to the residents based on factors like clean zone, tree bed width and tree height etc.
- Incorporate the functions of assigning volunteers to tree planting events, recording volunteer workload and feedback, and storing photos of the tree planted in the application.
- Implemented a stored procedure for admin to delete tree requests by entering request id (only admin has access to this data).

Database Design

- This project designs a data model with 10 classes: user, neighborhood, volunteer, permit, plantingZone, treeSpecies, treeRequest, treePlanting, volunteerPlant, siteVisit
- Use generalization to represent superclass User and subclass: Volunteer and Admin
- Use enum data type to represent a set of named, predefined values, such as application status and tree planting zone factors
- Enum data type attributes are represented in lookup tables to maintain flexibility as we can update statuses without altering the main table schema
- Created the neighborhood class which facilitates retrieving neighborhood, tree request and user information in report queries. Because resident and tree request is a many to many relationship, the neighborhood could be different in treeRequests table and users table
- Populates the database including real data of Oakland neighborhood, zip code, city approved tree species and relative tree characteristics
- In terms of physical design, storing the same attribute zip code in both user class and treeRequest class may seem redundant, but it addresses the situation that resident's address might be different from submitted treeRequest address

Reference

https://www.oaklandca.gov/resources/official-street-tree-list
https://www.treesforoakland.org/how-to-get-a-tree.html
https://docs.google.com/forms/d/e/1FAIpQLSccg6WxSEgPx-epsUc4OKMJuGkzMUuCtZP2xw1nyW-6p-7kug/viewform
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