Project Proposal Pitch: Fleet Vehicle Management

Team 02-4
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Problem statement

The TCNJ vehicle fleet is composed of many vehicles of different types, all of which have internal combustion engines. The current fleet is not as efficient as it could potentially be, both economically and environmentally. Other types of fuel and engines exist which, in the long term, can end up being beneficial to the college in terms of lowering the cost to maintain the vehicles as well as reducing CO2 emissions that impact the environment.

Objective of the application

The objective of our application is to help in decision making for an economically and environmentally stable vehicle fleet for TCNJ. By determining the most eco-friendly fuel sources, we can develop a purchasing strategy that maximizes benefits in relation to cost, providing for a cleaner campus and most effective budget.

This objective also encompasses our plan for the development of a secure and informative database which can hold financial data that can facilitate the analysis of what vehicles to purchase with their respective fuel source(s).

End product

We will develop a database system that allows for more cost-efficient and sustainable decisions relating to operation of the TCNJ vehicle fleet. A web-based user interface will also be implemented in connection with the database, to allow users to interact with, retrieve, and analyze the data using queries. Users can access this site and fill out fields and submit forms which will query the database, and the retrieved data from there can then be analyzed to best answer the users' questions about how best to compose the TCNJ vehicle fleet from an economical and environmental standpoint.

Importance and need for the module

The module will facilitate the analysis of which vehicles will provide the most environmentally and financially efficient option for the college. Using cost analysis, we will try and maximize the college’s environmental objectives while maintaining the respective budget. Investing in the proper machinery will provide for a cleaner campus environment.

The database and web interface will provide a secure and accessible tool to guide the college on which vehicles to purchase. Given that technology and energy is susceptible to change, our database will provide an initial foundation for storing this type of data as infrastructure for hydrogen and electric vehicles develop.

Researching the problem and obtaining data

We will use data provided by Paul Romano on the current makeup of the TCNJ vehicle fleet. The provided data files include information pertaining to operational costs of current and proposed types of TCNJ vehicles, as well as information on what types of vehicles currently make up the fleet, what types are proposed for the near future, and what types are planned to be added in the far future. To help deepen our understanding of the problem domain, we can conduct more research on different vehicle options that are both environmentally beneficial and economically viable.

Other existing systems

At the moment, TCNJ does not have an application to assist in economic and environmental analysis of the vehicle fleet. Our module will provide this functionality so that the college can use the module to facilitate decisions in the future relating to the campus vehicles.

Other applications of the system

In the future, the database should be able to be modified and upgraded to support new attributes and types of data that may become relevant to the topic of different types of fuel and engines for vehicles. The database can also be expanded upon to also provide support for other similar areas, where financial data may be stored to help when considering cost and budget in other TCNJ projects, not only the vehicle fleet.

Performance

At the moment, performance of our application is not a concern. The data files provided that we will be working with are small in size and should not slow down the app when analyzing data.

Security

The database should have restricted access, so that it can only be modified by authorized personnel. Since the database is unique to TCNJ and is not on a network, security is not a serious concern.

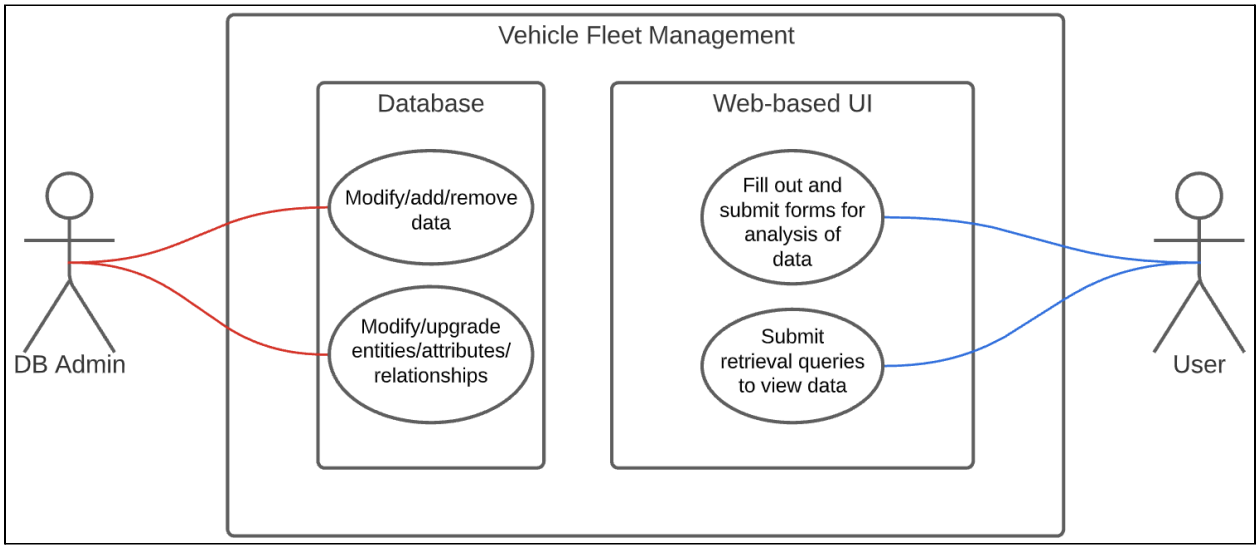
Backup and recovery

We will be using GitHub to store our application. GitHub is a well-known application for hosting code and managing software development used by many, so there is no concern of losing data that we host there. We will also use virtual machines on the TCNJ High Performance Computing Cluster. The manager of the cluster makes regular backups of all of the VMs, so in the event anything goes wrong we don't have to worry about losing our work.

Technologies and database concepts

Technologies and concepts that we will need to learn and use in the development of this application include git, Github, PostgreSQL, Python, SQL for simple queries to add, manipulate and retrieve data, and making ER diagrams.

System boundary diagram



This system boundary diagram shows the overall domain of our module, which is TCNJ vehicle fleet management. Within this module, we will have a database system as well as a web-based user interface for users to be able to access information about the data.

As seen in the use cases of each of these smaller components, database admins will be able to modify, add, or remove the data that is stored in the database. They can also modify and/or upgrade the database's entities, attributes, and relationships between those. Users can access only the web-based UI, and from there they can fill out forms and submit them to receive analysis of the data to answer their questions. If they wish to see a specific piece of information, they can use a form to submit a retrieval query to view the raw data.

Quad chart

TCNJ THE COLLEGE OF NEW JERSEY

Vehicle Fleet Management

Group 02-4

Need

- Develop a budget that maximizes benefit for environmental and economic reasons
- Application to assist in decisions relating to the vehicle fleet so that they are economical and sustainable

Approach

- Design a database system to store and organize data on vehicle fleet
- Develop application with user-friendly interface to allow access and analysis of data
- Manipulate and analyze data retrieved from the database to help in decision making for the college's budget

Benefit

- This app will help the stakeholders make better decisions from an economic and environmental standpoint
- Help TCNJ to become more eco-efficient
- TCNJ will save more money in the long term

Competition

- Focus on sustainability and environmental impact
- Can assist in more sustainable vehicle fleet operation both economically and environmentally

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