Individual Project A

Introduction
This project is inspired by the description of real studies done by IBM for PGE and Honda (Mayer-Schonberger and Cukier, pp.102-3).

Organization Description
Major Electric Corp (MEC) and The Electric Car Company (TECC) have formed a joint venture, Estations Inc., to create stations in carefully chosen locations around the city where people will be able to both park their electric cars for the day while they go to the office, and recharge them. Estations will use off the shelf software for most common functions, but is creating a special organization that you will head for creating and managing applications and databases.

Information Needs
Estation has a growing number of locations around the city, each of which will appear to be a simple parking garage. Each space in these garages can be configured as either a quick charge space, where a car can be fully charged in about 30 minutes, or a standard location, where it can take 3-8 hours, depending on the capacity of the car’s battery.

Estation needs to track reserved spots for those drivers who need to be sure they can charge their cars.

During the period for which this system is planned, we hope to reach 400 stations, though if things go especially well, it might be 1000. The stations will vary in their configurations, depending on the available space, the density of population of people with electric cars in the area, etc. Each station will have multiple levels (usually at least four, with some major city locations having as many as 20), with multiple aisles on each level (often 2-3, but some really large locations might have 6). Slots are on each side of an aisle, and can be anywhere from about 10 to 50 slots per side. We hope that most of our locations will eventually be filled 70% of the time through the 8 AM to 6 PM period, and 30% of the time the rest of the day. Each location may have different hours, depending on what is profitable for that location.

In some locations, all or part of the top floor will be dedicated to solar panels to collect electricity. This has the obvious advantage of cutting our electricity usage, particularly during the hot, sunny days of the summer, when electricity costs are often the highest. At least as importantly, it is a marketing tool for our environmentally conscious potential customers, who will like the idea that their cars were being charged by solar power. This does have costs and risks. Dedicating space to solar panels means costs in the panels themselves, as well as in the opportunity cost of not having those spaces available. It may or may not actually produce much energy, if the area is often cloudy, or a neighboring building puts the top floor in shade for part of the day.
We will need to be able to provide an app (probably using GPS and Google Maps information) that will help customers find a location for a particular period of time, which is close to either where they are now, or where they plan to be. They will tell us when they plan to be there, and when they plan to leave. The app will show them locations near that spot (perhaps eventually taking into account transit options from the locations). It will show them capacity that is not yet reserved for some portion of that period that will be able to charge their vehicle in the time they plan to be there. There is also an option for the customer to say that they will accept spaces available that would only provide a partial charge (mostly when they won’t be there long, and don’t want to use the quick charge space). They can make a reservation, paying by credit card, or wait until they arrive and take their chances on getting a space.

We will need to track our electricity expenses, where the rates can vary from hour to hour, based on demand on the grid, and also the production of electricity from our panels. We will also need to track equipment failures, both for the routine purpose of not placing customer cars in spaces that don’t work, and to let us analyze our costs of repair, and failure rates of different models of equipment.

**Common Transactions**

Probably most of the activity against the database is the app activity:

1. Find a location near the customer.
2. View the floors with available space during the period the customer will be there, with the available spaces indicated with their type.
3. Select a space, and then reserve it and pay for it.
4. Cancel a reservation.
5. Make a continuing reservation (applied to credit card monthly)

There will also be

7. Reports to see where we have especially large amounts of available space, for use in generating promotional emails to previous casual customers.

We expect about 30% of the spaces to be reserved on a continuous reservation during the day. The other 40% we anticipate filling, plus almost all off hours spaces used will be filled by people making requests of types 1, 2, and 3 each day. There will probably be at least 50% more requests than we actually get reservations. We hope cancellations will be no more than 10% of the total.

**Historical Reporting**

We will need to investigate a lot of different possibilities, not all of them predictable. These might include:

1. How profitable are the different locations over time (individual locations, locations in particular cities, locations of particular sizes, ones with and without solar panels)?
2. How much electricity are we getting from solar panels? How does this vary across time and location?
3. How do grid electrical rates vary over time? Currently, we do not charge customers varying amounts based on the varying rates, because of the complexity and public relations challenges. Are we losing money on some customers because of this?

4. How often are the locations at capacity for one kind of service or other?

5. How often are the quick charge spaces full? How does this vary by locations?

6. How often do cars remain in spaces of either type after they are fully charged?

7. Where did casual and continuous reservation customers hear of us?

Other Data Sources
We have access to information from government agencies on weather in the area, including indications of when it was sunny near each location or potential location. We have a long series of information on grid electricity rates in different locations over a few decades from our electrical company parent. We have data available from our car company parent on the amount of electricity need and maximum charging rates for the different models of cars (both the ones they manufacture and others). We have financial information about our construction costs, staffing costs etc. from existing off the shelf systems. We have access to data from the government on employment by category in different census tracts throughout the city, including statistical data on the typical salaries in each area. In some cities, we also have statistical information available on commuting patterns, indicating where in the region the people who work in a given part of the city typically live.

References