ZANACH Parking Garage

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Program Usage

Our program is an efficient parking garage system that tells the user (the person parking their car) where to park in the garage based on the spaces that are available. This is based upon a two-dimensional array that is built upon the number of floors and spaces per floor taken from the command line argument.

When the user chooses to park the car, rates for regular parking and VIP parking will be shown. Then, the user can choose to park either option or leave the garage. After the user has chosen the type of parking, the user will then be prompted to choose how long they will park their car for. After choosing these options, the user will then be prompted to enter their vehicle's make, model, color, and license plate. This information will be stored in the system. After entering this information, the program will let the user know which floor and space within that floor to park in.

After being parked for the allocated time, the user will come to retrieve the car. The user will enter the floor and space number of where the car is parked. And, for further confirmation, the license plate number will also have to be entered. Then, if there was no difficulty (towing or incorrect information), the program will print out the information of the car as well as the hours the car has been parked. The bill will also be shown. The user has the option of paying by cash or card and will receive a receipt (if asked for).

However, the user could forget where they parked their car and can then choose the find car option from the menu. The user will then enter the license plate number. If there are no difficulties, the program will output where the car is parked.

Aside from the user options, there is a manager option in the main menu of the garage. The manager will login with their username and password. There are six managers of ZANACH garage with their own login information. If the information is correct, the program will show the manager menu where the manager has the options of printing all license plates, print space information, printing current profit, print projected profit, tow errant car, or changing the password.

Each option within the program prevents the user from entering illogical answers to the questions prompted. For example, when choosing an option for the type of parking, if the user does not enter the number for regular, VIP, or to leave the garage, the question will be prompted again. The same action will occur if the user does not enter an integer. These options will be further explained in the next sections.

User Option: Park Car

To elaborate on VIP parking, the garage lets only VIP parking on the first floor. Regular parking starts from the next floor, if there is one depending on the command line argument. The rates for VIP parking are ten dollars more than the rates for regular parking. If VIP parking is full, the user will be charged the regular rates, and they will need to park above the first floor.

When entering the license plate number for the car information, there are a number of checks in the program to prevent errors. For example, if the license plate number entered already exists in the garage, the program will tell the user where that car is and whether they would like to enter a different number, retrieve the car with that number, to find their lost car, or to leave the garage. Moreover, the checks will prevent the user from enter an invalid license plate number.

Every time a car enters the system, a new car object will be made that stores all the information of each car, so that the user can see that information when retrieving or finding their car.

User Option: Retrieve Car

The retrieve car option is only for the users who know where their cars are parked. But, entering the floor and space number to retrieve a car is not necessarily safe for people who have parked in the garage. Therefore, the user also has to enter the correct license plate number. If the car has been towed, the user will be charged additional two-hundred dollars. If the space is unoccupied, the case will restart.

When paying the garage fare with cash, the user has to enter the amount of cash they will insert into the machine. If the change is less than zero dollars, the user did not have enough money and has to insert more. After paying, a receipt will be printed.

When paying with card, the program will take time to authorize and then accept the card. A receipt will be printed then as well.

User Option: Find Car

If the user cannot find their car in the space or if they do not remember the space where they parked, they can use the find car option. If the car has been towed, the user will be redirected to checkout. Otherwise, the space and floor number of the car will be printed. This is all based upon the license plate number.

Manager Menu

After logging in with the correct information (redirected to the beginning of the manager option if not), the manager logged in has six options to choose from. The print license plates option will print the license plates of the cars currently in the garage. The print space info option will show the manager whether a specific spot is currently occupied. This is here to ensure if the user's options do not work, the person can come to the manager to find a parking

spot. If the space is occupied, the manager will receive the car's information as well as the type of parking and fee. The total profit option will show the manager how much money has been made from the people who have already retrieved their cars. The total projected profit will be the amount of money that could be made from the profit already made as well as the profit from the cars that have not left the garage. The tow errant car option will allow the manager to pick a car in a specific spot to tow based on whether the manager has seen the car being parked for longer than the allocated time. The program will print the information of the car and will ask the manager if this is the car to be towed. Once the car is towed, the fee for the user will change. The last option is to change the password for the login. The manager has to enter their current password to change the password.

Lessons Learned

Team projects are an excellent way to understand how the workplace is like because most if not all of the projects that are worked on in companies are done in teams to ensure efficiency. Dividing up the work among the group based upon our strengths helped us make a strong program that has the potential of being an advanced system for parking. In terms of coding, there are a few lessons we learned to make the program more concise and efficient. For this program, a two-dimensional array proved as better option than linked lists or vectors to find each car object with the information stored. Moreover, the "goto" keyword helped to redirect parts of the program to another based on conditions placed on the user and manager. Based on the group's effort, this program is a culmination of the lessons we have learned from Programming Fundamentals 2 concerning constructors, arrays, pointers, and setters and getters.

Future Work

The parking garage program can be advanced even further based upon conditions as well as better security. For example, the parking garage could allow valet parking, which would be much more expensive, especially if the user were to choose VIP parking. Also, the user could want to enter ten cars at once (a family vacation perhaps) and could want to pay for all of these cars at once. In terms of security, even though the program prompts the user to enter the license plate number in the find car option, the program could be made safer. For example, the program could have an option to scan the user's driver's license as information to be stored in the car object as additional security. If the wrong driver's license is entered, a manger could be alerted by the program. There are many ways to expand this program, but the program itself is already an intelligent garage system.