[Midterm extra credit / used the same domain]

## 1. Introduction

This project is an implementation of the Structured Query Language (SQL) with the PHP language to develop a database of the information of houses for sale. The database contains the generic information of the houses, including location, area, built, number of bedrooms, type of garage, type of basement, utilities, and the price. Both the database and the program (PHP website) are running on the Penn State server and can be accessed via a web browser from any computers on the same network. The program can also perform any simple transactions such as displaying the joined tables, inserting data, deleting data, and sorting the displayed data. With the SQL language in the background, the program created in this project can also be considered as an interface of a house selling database for people who do not have a background in the SQL language. However, the program is the first prototype with the purpose of the creator to study how to infuse PHP language with the SQL database; the creator did not consider the security or the robustness of the program. The sample data used in the program also came from the generator on the website www. generatedata.com/generator for educational purposes.

## 2. Description of the problem to be solved

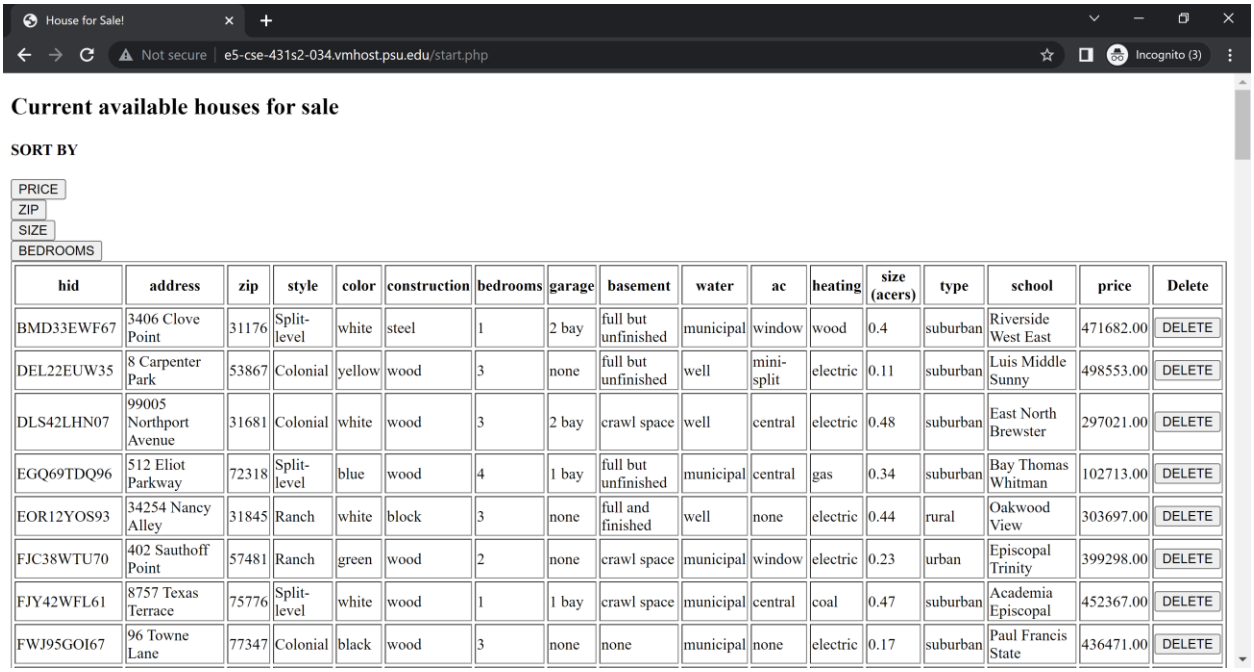
Real Estate is a big business and the data flowing in the system is enormous. There are many tiny details about the houses on the selling board that need to be accounted for. The information about a house is mainly divided into two group: the unique information, and the sharing information. The unique information is basically specific to a house such as the address and the price. The shared information is the information that some houses have in common such as the style of the house, the type of garage, the utilities type of water and heating. The most effective way to manage the database system is to divide the data into multiple tables to avoid data anomalies. The tables in this project are in the Third Normal Form (3NF). In the SQL language, the tables can be easily created and managed. However, when implementing the SQL language into the PHP language, there are some problems to be considering because of the logic of the PHP language is not the same as the SQL language. Here is the list of the problem in each function of the program.

I. Displaying data
   The data displaying on the program should be sorted in a specific order. This could be the address, price, etc. There should be a button on the program to change the sorting filter of the data.
II. Inserting data
   As mentioned, the data is managed into multiple tables. By hitting one insert data button, the PHP code in the background must process into multiple data tables. The program should also be reversible when need to.
III. Deleting data
   A specific row should be deleted from the displayed table when a delete function is called. The users should also be able to do a justifiable rollback.
IV. Updating data
   In a data update, we should be able to select a specific row from the given information. Then, only a specific column on a specific table should be updated.

To make the program works, these functions need to work properly between the PHP language and the SQL language.

The Following pages are the interfaces of the program with the descriptions.

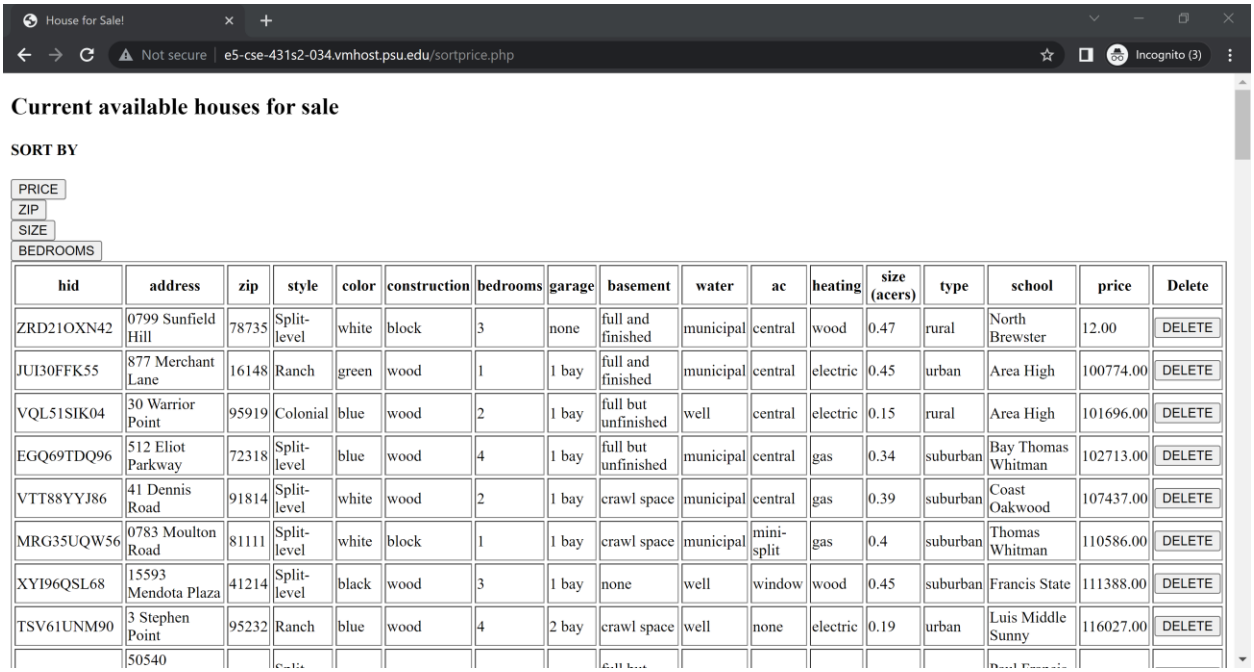
## a. Start page (homepage)




| hid | address | zip | style | color | construction | bedrooms | garage | basement | water | ac | heating | size (acers) | type | school | price | Delete |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BMD33EWF67 | 3406 Clove Point | 31176 | Split-level | white | steel | 1 | 2 bay | full but unfinished | municipal | window | wood | 0.4 | suburban | Riverside West East | 471682.00 | DELETE |
| DEL22EUW35 | 8 Carpenter Park | 53867 | Colonial | yellow | wood | 3 | none | full but unfinished | well | mini-split | electric | 0.11 | suburban | Luis Middle Sunny | 498553.00 | DELETE |
| DLS42LHN07 | 99005 Northport Avenue | 31681 | Colonial | white | wood | 3 | 2 bay | crawl space | well | central | electric | 0.48 | suburban | East North Brewster | 297021.00 | DELETE |
| EGQ69TDQ96 | 512 Eliot Parkway | 72318 | Split-level | blue | wood | 4 | 1 bay | full but unfinished | municipal | central | gas | 0.34 | suburban | Bay Thomas Whitman | 102713.00 | DELETE |
| EOR12YOS93 | 34254 Nancy Alley | 31845 | Ranch | white | block | 3 | none | full and finished | well | none | electric | 0.44 | rural | Oakwood View | 303697.00 | DELETE |
| FJC38WTU70 | 402 Sauthoff Point | 57481 | Ranch | green | wood | 2 | none | crawl space | municipal | window | electric | 0.23 | urban | Episcopal Trinity | 399298.00 | DELETE |
| FJY42WFL61 | 8757 Texas Terrace | 75776 | Split-level | white | wood | 1 | 1 bay | crawl space | municipal | central | coal | 0.47 | suburban | Academia Episcopal | 452367.00 | DELETE |
| FWJ95GOI67 | 96 Towne Lane | 77347 | Colonial | black | wood | 3 | none | none | municipal | none | electric | 0.17 | suburban | Paul Francis State | 436471.00 | DELETE |

The start page or the home page displays all the information from all the tables in the ascending order of the hid because of the primary key of the table. Above the table, there are four button to link to other pages that sort the displayed data in a different order. There is also a delete button at the end of each row to delete the selected house from the selling list.

## b. Sorting Page



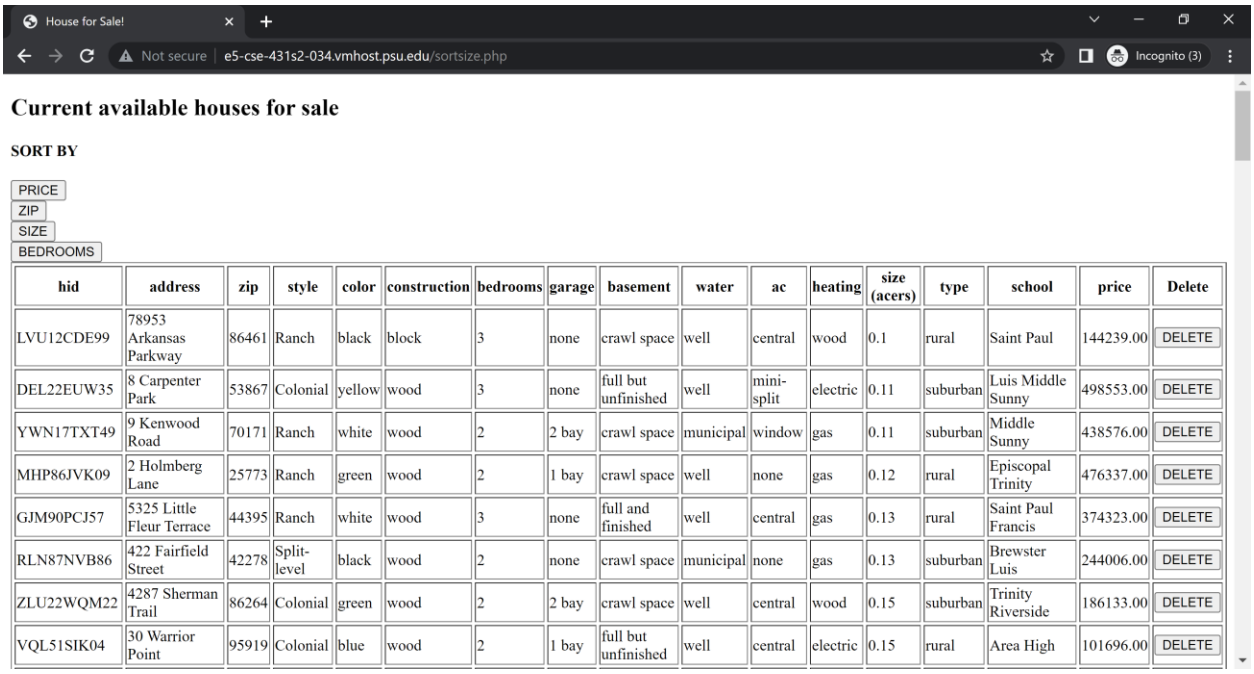

**Current available houses for sale**

**SORT BY**

PRICE
ZIP
SIZE
BEDROOMS

| hid | address | zip | style | color | construction | bedrooms | garage | basement | water | ac | heating | size (acers) | type | school | price | Delete |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ZRD21OXN42 | 0799 Sunfield Hill | 78735 | Split-level | white | block | 3 | none | full and finished | municipal | central | wood | 0.47 | rural | North Brewster | 12.00 | DELETE |
| JUI30FFK55 | 877 Merchant Lane | 16148 | Ranch | green | wood | 1 | 1 bay | full and finished | municipal | central | electric | 0.45 | urban | Area High | 100774.00 | DELETE |
| VQL51SIK04 | 30 Warrior Point | 95919 | Colonial | blue | wood | 2 | 1 bay | full but unfinished | well | central | electric | 0.15 | rural | Area High | 101696.00 | DELETE |
| EGQ69TDQ96 | 512 Eliot Parkway | 72318 | Split-level | blue | wood | 4 | 1 bay | full but unfinished | municipal | central | gas | 0.34 | suburban | Bay Thomas Whitman | 102713.00 | DELETE |
| VTT88YYJ86 | 41 Dennis Road | 91814 | Split-level | white | wood | 2 | 1 bay | crawl space | municipal | central | gas | 0.39 | suburban | Coast Oakwood | 107437.00 | DELETE |
| MRG35UQW56 | 0783 Moulton Road | 81111 | Split-level | white | block | 1 | 1 bay | crawl space | municipal | mini-split | gas | 0.4 | suburban | Thomas Whitman | 110586.00 | DELETE |
| XYI96QSL68 | 15593 Mendota Plaza | 41214 | Split-level | black | wood | 3 | 1 bay | none | well | window | wood | 0.45 | suburban | Francis State | 111388.00 | DELETE |
| TSV61UNM90 | 3 Stephen Point | 95232 | Ranch | blue | wood | 4 | 2 bay | crawl space | well | none | electric | 0.19 | urban | Luis Middle Sunny | 116027.00 | DELETE |
| | 50540 | | | | | | | | | | | | | | | |

Sorted by price (above) and sorted by size (below).




**Current available houses for sale**

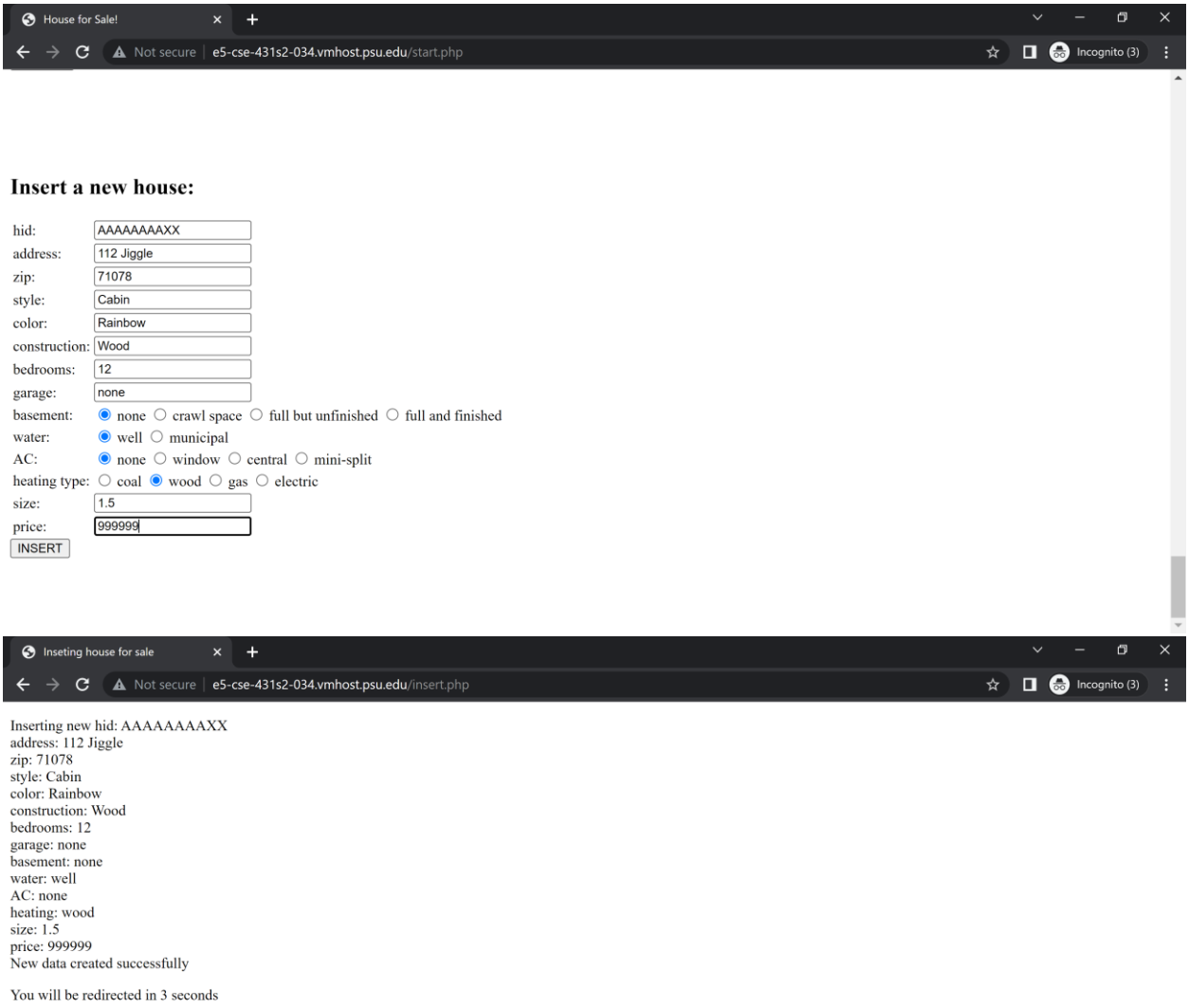
**SORT BY**

PRICE
ZIP
SIZE
BEDROOMS

| hid | address | zip | style | color | construction | bedrooms | garage | basement | water | ac | heating | size (acers) | type | school | price | Delete |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LVU12CDE99 | 78953 Arkansas Parkway | 86461 | Ranch | black | block | 3 | none | crawl space | well | central | wood | 0.1 | rural | Saint Paul | 144239.00 | DELETE |
| DEL22EUW35 | 8 Carpenter Park | 53867 | Colonial | yellow | wood | 3 | none | full but unfinished | well | mini-split | electric | 0.11 | suburban | Luis Middle Sunny | 498553.00 | DELETE |
| YWN17TXT49 | 9 Kenwood Road | 70171 | Ranch | white | wood | 2 | 2 bay | crawl space | municipal | window | gas | 0.11 | suburban | Middle Sunny | 438576.00 | DELETE |
| MHP86JVK09 | 2 Holmberg Lane | 25773 | Ranch | green | wood | 2 | 1 bay | crawl space | well | none | gas | 0.12 | rural | Episcopal Trinity | 476337.00 | DELETE |
| GJM90PCJ57 | 5325 Little Fleur Terrace | 44395 | Ranch | white | wood | 3 | none | full and finished | well | central | gas | 0.13 | rural | Saint Paul Francis | 374323.00 | DELETE |
| RLN87NVB86 | 422 Fairfield Street | 42278 | Split-level | black | wood | 2 | none | crawl space | municipal | none | gas | 0.13 | suburban | Brewster Luis | 244006.00 | DELETE |
| ZLU22WQM22 | 4287 Sherman Trail | 86264 | Colonial | green | wood | 2 | 2 bay | crawl space | well | central | wood | 0.15 | suburban | Trinity Riverside | 186133.00 | DELETE |
| VQL51SIK04 | 30 Warrior Point | 95919 | Colonial | blue | wood | 2 | 1 bay | full but unfinished | well | central | electric | 0.15 | rural | Area High | 101696.00 | DELETE |

There are four buttons above the displayed table and each button links to four different pages. Each page is similar to the start page except the SQL select statement request a specific order of the query. The sorting options in this program are by prices, zip code, area size, and the number of bedrooms.

## c. Insert

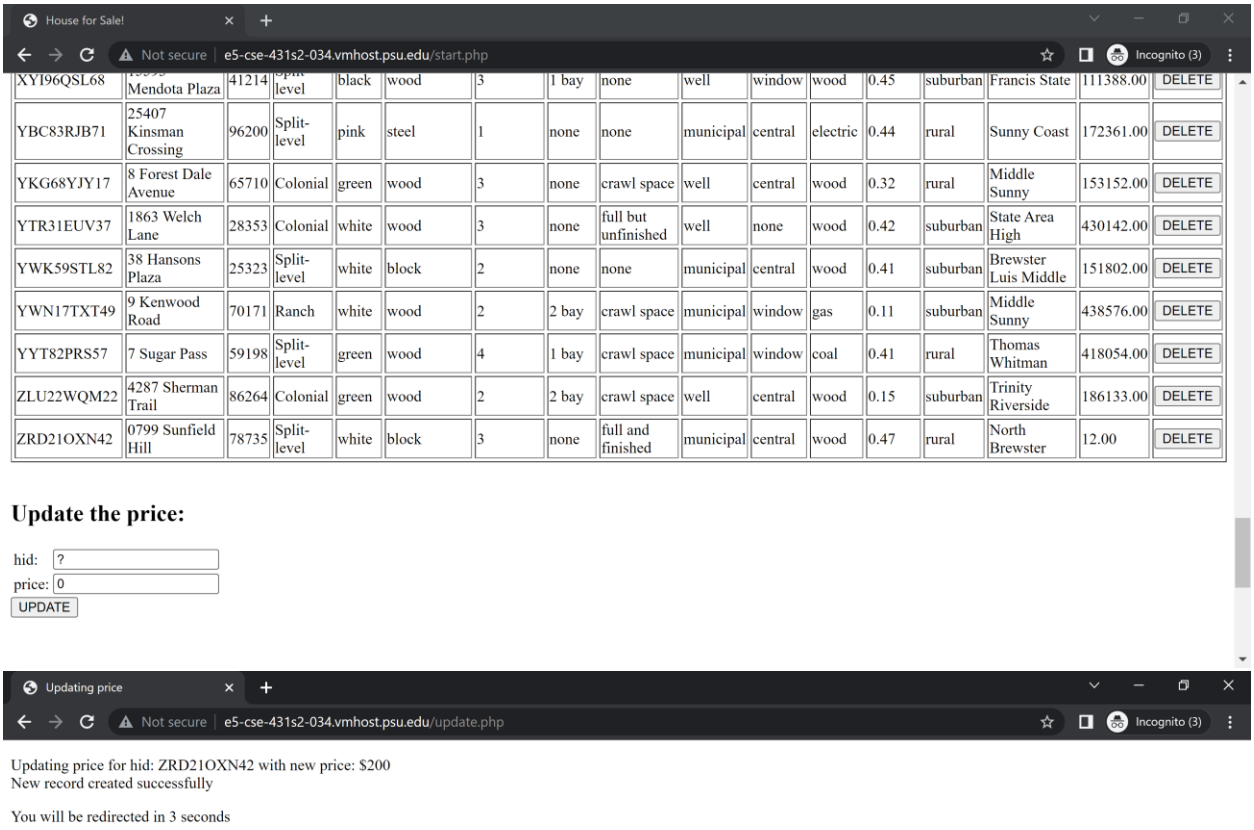



The insert function is at the bottom of the program. It contains 10 boxes and four selections for the new house information. After clicking the submit button, the program links to the insert.php page, which is where the SQL language happens, and it shows the entered data into the data base. The program also redirects to the homepage automatically after three seconds.

**d. Delete**


The delete buttons are located after each row of the displayed table in the homepage. After clicking the button, the program links to the delete.php page, which is where the SQL execution happens. The program also redirects to the homepage automatically after three seconds.

## e. Update




| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XYI96QSL68 | Mendota Plaza | 41214 | level | black | wood | 3 | 1 bay | none | well | window | wood | 0.45 | suburban | Francis State | 111388.00 | DELETE |
| YBC83RJB71 | 25407 Kinsman Crossing | 96200 | Split-level | pink | steel | 1 | none | none | municipal | central | electric | 0.44 | rural | Sunny Coast | 172361.00 | DELETE |
| YKG68YJY17 | 8 Forest Dale Avenue | 65710 | Colonial | green | wood | 3 | none | crawl space | well | central | wood | 0.32 | rural | Middle Sunny | 153152.00 | DELETE |
| YTR31EUV37 | 1863 Welch Lane | 28353 | Colonial | white | wood | 3 | none | full but unfinished | well | none | wood | 0.42 | suburban | State Area High | 430142.00 | DELETE |
| YWK59STL82 | 38 Hansons Plaza | 25323 | Split-level | white | block | 2 | none | none | municipal | central | wood | 0.41 | suburban | Brewster Luis Middle | 151802.00 | DELETE |
| YWN17TXT49 | 9 Kenwood Road | 70171 | Ranch | white | wood | 2 | 2 bay | crawl space | municipal | window | gas | 0.11 | suburban | Middle Sunny | 438576.00 | DELETE |
| YYT82PRS57 | 7 Sugar Pass | 59198 | Split-level | green | wood | 4 | 1 bay | crawl space | municipal | window | coal | 0.41 | rural | Thomas Whitman | 418054.00 | DELETE |
| ZLU22WQM22 | 4287 Sherman Trail | 86264 | Colonial | green | wood | 2 | 2 bay | crawl space | well | central | wood | 0.15 | suburban | Trinity Riverside | 186133.00 | DELETE |
| ZRD21OXN42 | 0799 Sunfield Hill | 78735 | Split-level | white | block | 3 | none | full and finished | municipal | central | wood | 0.47 | rural | North Brewster | 12.00 | DELETE |

**Update the price:**

hid: ?
price: 0
UPDATE



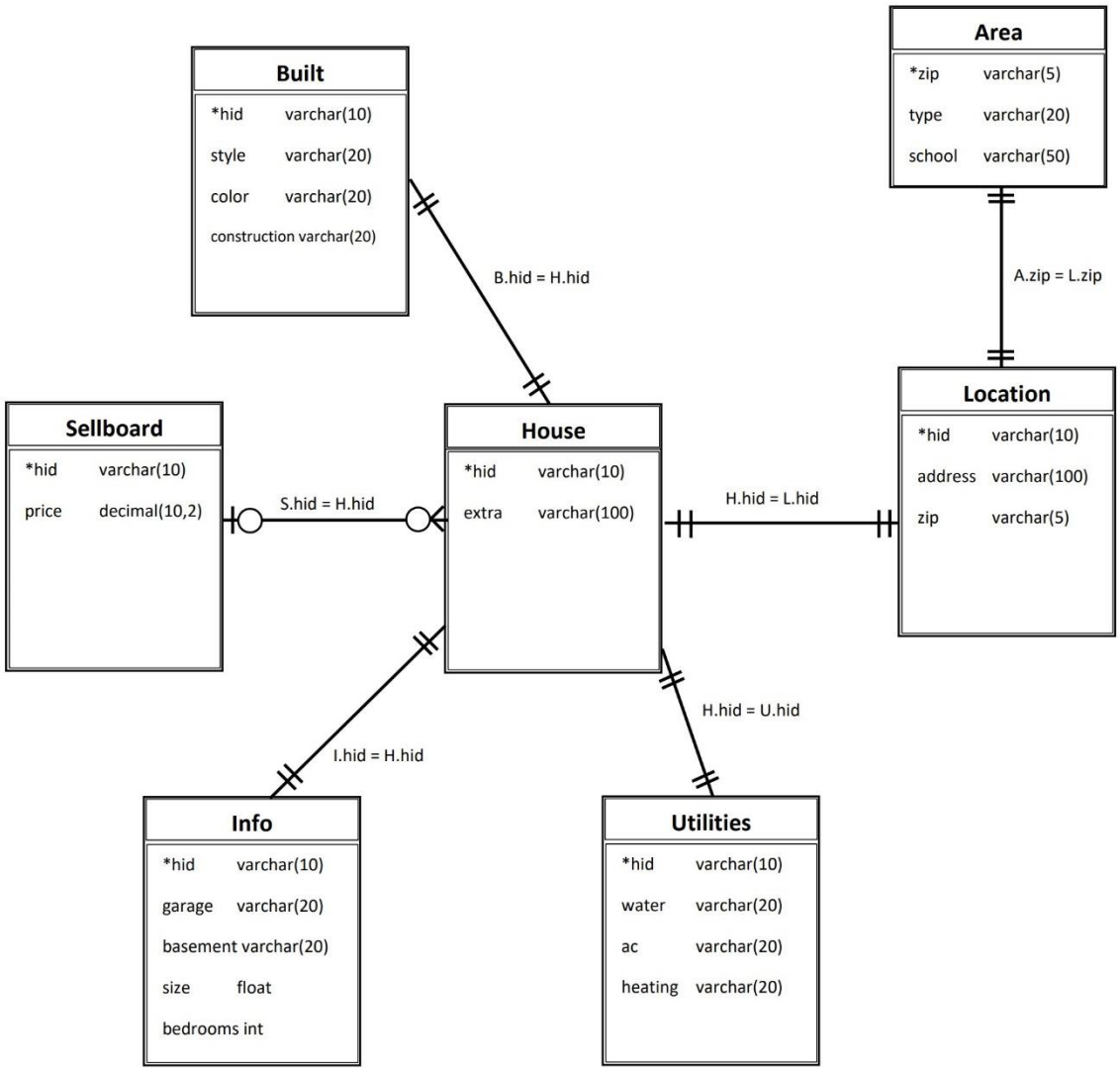

Updating price for hid: ZRD21OXN42 with new price: $200
New record created successfully

You will be redirected in 3 seconds

The update function is located below the displayed table in the homepage. The function takes two inputs: hid and the new price. After clicking the update button, the program links to update.php, which is where the SQL executes the update. The program automatically redirects to the homepage after three seconds.

## 3. Database Design

### 3.1. Crow's foot diagram (1 page)



**4. List of all transactions**

There are multiple transactions in the program, mainly divided by the functions: sorting, inserting, deleting, and updating.

Sorting function has four different ways meaning there are four transactions for this function. Each of them is a SELECT statement from the tables with different ORDER BY condition. The SELECT statements chose data from six tables connecting with the same hid. The data includes hid, address, zip, style, color, construction, bedrooms, garage, basement, water, AC, heating, size, type, school, price, from table Sellboard, Location, Built, Info, Utilities, and Area. The queries then got sent out as a variable in PHP.

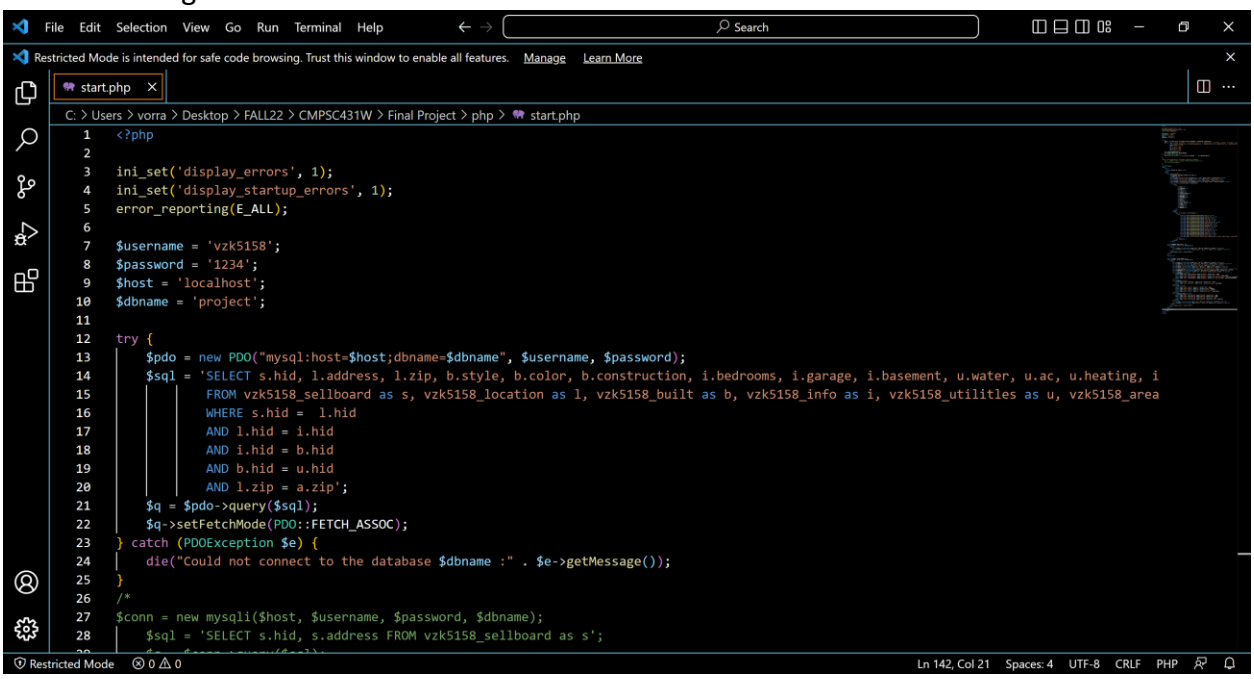
Inserting takes inputs from the homepage and execute the INSERT INTO function in the insert.php. The input data is separated into five tables, and I used mysqli method to insert to multiple tables. After each data is stored in a different table, it can be used later from a joined table.

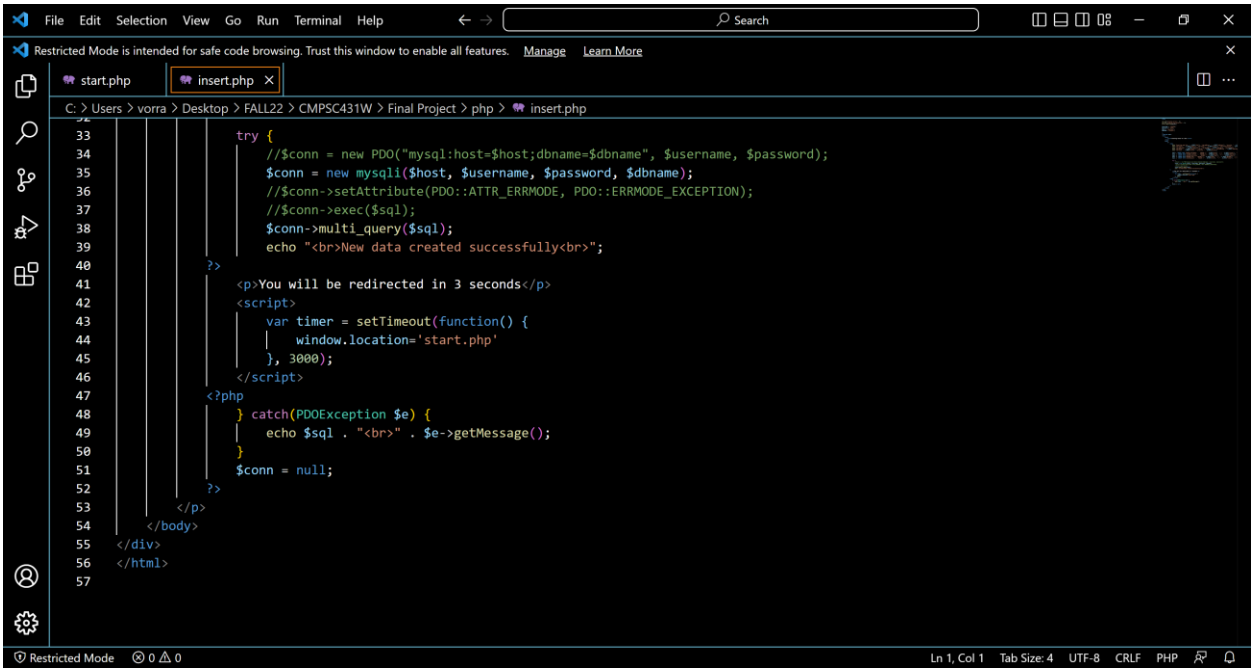
Deleting is a little different from inserting and updating. Instead of taking input from the homepage, there are Delete button at the end of each row. By clicking the button, it sends the hid of that row automatically to the delete.php. The page then executes the DELETE FROM the table Sellboard with the hid equal to the input hid.

Updating is similar to inserting; it takes two inputs from the homepage: hid and price. After that, it sends the two variables to update.php where it executes the UPDATE table Sellboard SET value equal to the input price WHERE the hid is equal to the input hid.

## 5. Error Trapping

The error trapping is set every time when the SQL code is used. Instead of executing the SQL language itself, I used function try-catch from the PHP language to run the SQL code. If there is an error, the catch function could raise the error and detect what happen. There are multiple cases of this implementation such as in the start.php (homepage). At the beginning of the code, the try-catch function is used before excuting the SQL SELECT statement to show the displayed table as the first picture below. The second picture is also the same idea with the insert.php when inserting new house information into the database.



## 6. Summary

As stated in the second part, the number of the information of a house in the market is complex. By implementing this program, the data is easier to manage. Firstly, the data storage in the database of this program is in the Third-Normal form, which means that the data is gathered not to be duplicated. The data is managed into multiple tables with keys and indexes for the easiness to access. However, the program displays the data in a joined table form, which means that it is easy to see an information for a house on the database without using any technical skills. By using the Third-Normal form, the program also helps manage some information such as the area type and the school in the area from indicating the zip code. There is one table to contain the shared information of the area using only the zip code as a primary key, that means the users only need to know the zip code of the house and the program will handle the other information. In conclusion, the program helps people managing the housing information on the real estate market and the program requires no technical background to be used. The program is also new-user friendly and easy to be accessed. However, the program is the first prototype, and it was created from an education purpose of the creator. The program only performs under a limited circumstance; the program is running on a local network and no security – anybody can access the database. It is currently not safe to use this program for a business or for sensitive information.

Besides that, the creator found the implementation of this program difficult in the PHP language area. Even though PHP is a high-level language and is easy to use, the adaptation between SQL and PHP takes practice and time to be understand. However, the experience was rewarding, and the result was impressive for the creator.