ECE 175 Computer Programming for Engineering Applications

Fall 2017

Lab Assignment #8

Wednesday March 28

Relevant Programming Concepts:

- **Structures**

1 Land to Buy

Define the following data type that describes different parcels of land.

```
typedef struct {
  char listing_name[20];
  double acres;
  int price_per_acre;
  double length;
  double width;
  double price;
} Parcel;
```

Develop a C program that reads a file called *Land_Listings.txt* into a 10-element array of type *Parcel*. The file *Land_Listings.txt* contains the listing name, lot length in feet, lot width in feet, and lot price in dollars. You will need to calculate acreage and price per acre (rounded to the nearest dollar). Recall: 1 $acre = 43560.174 ft^2$. The program then prints the listings sorted by price per acre. Your program should use the following functions:

```
void scan_listings(Parcel *x, FILE *in);
void print_listings(Parcel *x);
```

File *Land_Listings.txt*:

```
Smith      215.27     838.12    49655.24
Johns      746.79     319.64    89976.92
Williams   445.10     681.28    82162.92
Jones      931.81     379.48    64491.04
Davis      465.99     831.80    81797.43
Taylor     418.65     502.81    66022.76
Jackson    846.22     709.47    34197.06
Clark      525.15     428.89    28972.59
Wright     202.65     304.62    34119.36
Adams      672.14     189.65    53407.90
```

Sort the array of parcels in terms of price per acre, then print the sorted array to the screen. The following functions will sort an array of type *int*. Modify these functions to receive *Parcel*, and operate on *Parcel*.

```
void selection(int x[], int size) { // selection sort
  int i, j;
  int max;

  for (i = 0; i < size; i++) {
    max = i; // start searching from currently unsorted
    for (j = i; j<size; j++) {
      if (x[j] > x[max]) // if found a bigger element
        max = j; // move it to the front
    }
    swap(&x[i], &x[max]);
  }
}

void swap(int *x, int *y) {
  int temp;
  temp = *x;
  *x = *y;
  *y = temp;
}
```

HINT: The swap function protocol should be

```
void swap(Parcel *x, Parcel *y);
```

And the *if* statement in *selection* should be

```
if(x[j].price_per_acre > x[min].price_per_acre)//if found a smaller element
```

Expected Output

```
The Wright property costs $24076 per acre
The Adams property costs $18251 per acre
The Johns property costs $16420 per acre
The Taylor property costs $13662 per acre
The Smith property costs $11989 per acre
The Williams property costs $11803 per acre
The Davis property costs $9193 per acre
The Jones property costs $7945 per acre
The Clark property costs $5603 per acre
The Jackson property costs $2481 per acre
```