Due Date: Friday, April 28, 2017 before 9:00pm.

Instructions: This is an individual homework assignment. There are two problems worth 20 points each. Solve the problem below by yourself (unlike the labs, where you work collaboratively), and submit the solution as a C++ source code file. Here are a few more important details:

1. Unlike the computer lab exercises, this is not a collaborative assignment.

2. Because all homework assignments are submitted and tested electronically, the following are important:
   - You follow any naming conventions mentioned in the homework instructions.
   - You submit the correct file(s) through Moodle by the due deadline.
   - You follow the example input and output formats exactly given in each problem description.
   - Regardless of how or where you develop your solutions, your programs compile and execute on cselabs computers running the Linux operating system.

3. You should test your program on other test cases (that you make up) as well. Making up good test cases is a valuable programming skill, and is part of ensuring your code solution is correct.

Problem A: People and vehicles (20 points)
For this part you will be keeping information on people and what cars they are driving. Your program should have the following options:

p : create a new person in the database (you may assume this person's name is only one word)
c : create a new car in the database (you may assume the car's name will be only one word)
f : find and select a person in the database (if there is no such person, show “no one”)
r : register the current person selected to a specified car (if there is no such car, they should be unregistered to any current cars)

You may assume there will be no more than 100 cars in the database and no more than 100 people. If you try and find (and select) a person that doesn't exist, show “no one” for both the person and car. If a person is not registered to a car, show “no one” for the car. You may assume all people have different names and all cars have different names. However, a car and person might have the same name (see example 2).

Each person can only be registered to a single car, but a car can have multiple people registered to it simultaneously (see example 3).

Hint 1: use classes (and don't dump everything in a single function)

Hint 2: use pointers (really!) or you might regret it when part B comes around
Example 1 (user input underlined):
Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
p
What is this person's name?
qinshu

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
c
What is this car's name?
putput

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
f
Which person do you want to find?
qinshu

Currently looking at:
Person: qinshu
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
r
Which car do you wish to register this person to?
putput

Currently looking at:
Person: qinshu
In car: putput
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
r
Which car do you wish to register this person to?
mcstinks
Currently looking at:
Person: qinshu
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
f
Which person do you want to find?
ahmed

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
p
What is this person's name?
ahmed

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
f
Which person do you want to find?
ahmed

Currently looking at:
Person: ahmed
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
q

Example 2 (user input underlined):
Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
p
What is this person's name?
cp
Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
f
Which person do you want to find?
cp

Currently looking at:
Person: cp
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
r
Which car do you wish to register this person to?
cp

Currently looking at:
Person: cp
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
c
What is this car's name?
cp

Currently looking at:
Person: cp
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
r
Which car do you wish to register this person to?
cp

Currently looking at:
Person: cp
In car: cp
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
q

Example 3 (user input underlined):
Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

c
What is this car's name?
bus

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

p
What is this person's name?
a

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

p
What is this person's name?
b

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

p
What is this person's name?
c

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

f
Which person do you want to find?
a

Currently looking at:
Person: a
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
Currently looking at:
Person: a
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

Which car do you wish to register this person to?

bus

Currently looking at:
Person: a
In car: bus
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

Which person do you want to find?

b

Currently looking at:
Person: b
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

Which car do you wish to register this person to?

bus

Currently looking at:
Person: b
In car: bus
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

Which person do you want to find?

c

Currently looking at:
Person: c
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit

Which car do you wish to register this person to?
Currently looking at:
Person: c
In car: bus
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
f
Which person do you want to find?
a
Currently looking at:
Person: a
In car: bus
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
q

When you are done, name the source code file <username>_9A.cpp. Here you replace <username> with your U of M email address; for example, if your email address is smithx1234@umn.edu, your file should be named smithx1234_9A.cpp. Then submit your program using the HW 9 Problem A submission link in Moodle.

**Problem B: Renaming and linking (20 points)**
Add two more options to the code from part A:

l - links two people together so they both use the same car. The first name entered is the follower and the second name is the leader. They both use the leader's car.
e - rename a car. (This should apply to all people using this car.)

As both “link” and “register car” should change the person's car, use the most recent command to determine which car they are in. Thus if a person chooses to “link”, they should then unregister the current car and only use the link. If a person chooses to “register a car”, they should remove any “links” currently active.

If you enter either an invalid person name for the follower of “link” or an invalid car name for “rename”, tell them this thing doesn't exist and proceed to the next command. If you enter an invalid “leader” for the link command (second name), then unlink any current links. You may assume we will not try to link a person to themselves (i.e. command: “l” then “daddy” with “daddy”).

**Hint:** hope you used pointers... if so this should not require minimal code addition.

Example 1 (user input underlined):
Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

What is this person's name?  
daddy

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

What is this person's name?  
kiddo

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

Enter person who you want to tag along:  
kiddo
Who do you want this person to follow?  
daddy

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

Which person do you want to find?  
daddy

Currently looking at:
Person: daddy
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a
person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

C
What is this car's name?

helicopter

Currently looking at:
Person: daddy
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

R
Which car do you wish to register this person to?

helicopter

Currently looking at:
Person: daddy
In car: helicopter
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

F
Which person do you want to find?

kiddo

Currently looking at:
Person: kiddo
In car: helicopter
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

P
What is this person's name?

bestToyEver

Currently looking at:
Person: kiddo
In car: helicopter
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
Enter person who you want to tag along: 
bestToyEver
Who do you want this person to follow? 
kiddo

Currently looking at:  
Person: kiddo  
In car: helicopter

Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit 
... You can also: (e) rename a car or (l) link one person's car to another 

Which person do you want to find? 
bestToyEver

Currently looking at:  
Person: bestToyEver  
In car: helicopter

Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit 
... You can also: (e) rename a car or (l) link one person's car to another 

Which person do you want to find? 
daddy

Currently looking at:  
Person: daddy  
In car: helicopter

Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit 
... You can also: (e) rename a car or (l) link one person's car to another 

What is this car's name? 
submarine

Currently looking at:  
Person: daddy  
In car: helicopter

Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit 
... You can also: (e) rename a car or (l) link one person's car to another 

Which car do you wish to register this person to?
submarine

Currently looking at:
Person: daddy
In car: submarine
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
f
Which person do you want to find?
kiddo

Currently looking at:
Person: kiddo
In car: submarine
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
e
What car do you wish to rename?
submarine
Enter new name:
sub

Currently looking at:
Person: kiddo
In car: sub
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
e
What car do you wish to rename?
submarine
No such car...

Currently looking at:
Person: kiddo
In car: sub
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
r
Which car do you wish to register this person to?

**helicopter**

Currently looking at:
Person: kiddo
In car: helicopter
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

e
What car do you wish to rename?

**helicopter**
Enter new name:

**floppycopter**

Currently looking at:
Person: kiddo
In car: floppycopter
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

f
Which person do you want to find?

**bestToyEver**

Currently looking at:
Person: bestToyEver
In car: floppycopter
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

f
Which person do you want to find?

**daddy**

Currently looking at:
Person: daddy
In car: sub
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

q
Example 2 (user input underlined):
Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
p
What is this person's name?
p1

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
p
What is this person's name?
p2

Currently looking at:
Person: No one
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
f
Which person do you want to find?
p1

Currently looking at:
Person: p1
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another
c
What is this car's name?

electric
Currently looking at:
Person: p1
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

Which car do you wish to register this person to?
electric

Currently looking at:
Person: p1
In car: electric
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

Enter person who you want to tag along:
p2
Who do you want this person to follow?
p1

Currently looking at:
Person: p1
In car: electric
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

Which person do you want to find?
p2

Currently looking at:
Person: p2
In car: electric
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

Enter person who you want to tag along:
asldfjioh
No such person exists...
Currently looking at:
Person: p2
In car: electric
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

Enter person who you want to tag along:
p2
Who do you want this person to follow?
asldfoij

Currently looking at:
Person: p2
In car: No one
Do you want to: (p) make a new person, (c) make a new car, (f) find a person, (r) register a person to a car, or (q) quit
... You can also: (e) rename a car or (l) link one person's car to another

q

When you are done, name the source code file <username>_9B.cpp. Here you replace <username> with your U of M email address; for example, if your email address is smithx1234@umn.edu, your file should be named smithx1234_9B.cpp. Then submit your program using the HW 9 Problem B submission link in Moodle.