

# Project - RetrieverBell

## Project Description

Because of a new surprise round of antitrust cases, a new phone company RetrieverBell was created. You've been hired as the single programmer whose duty is to code the connection servers for all of the phones signed up with your company.

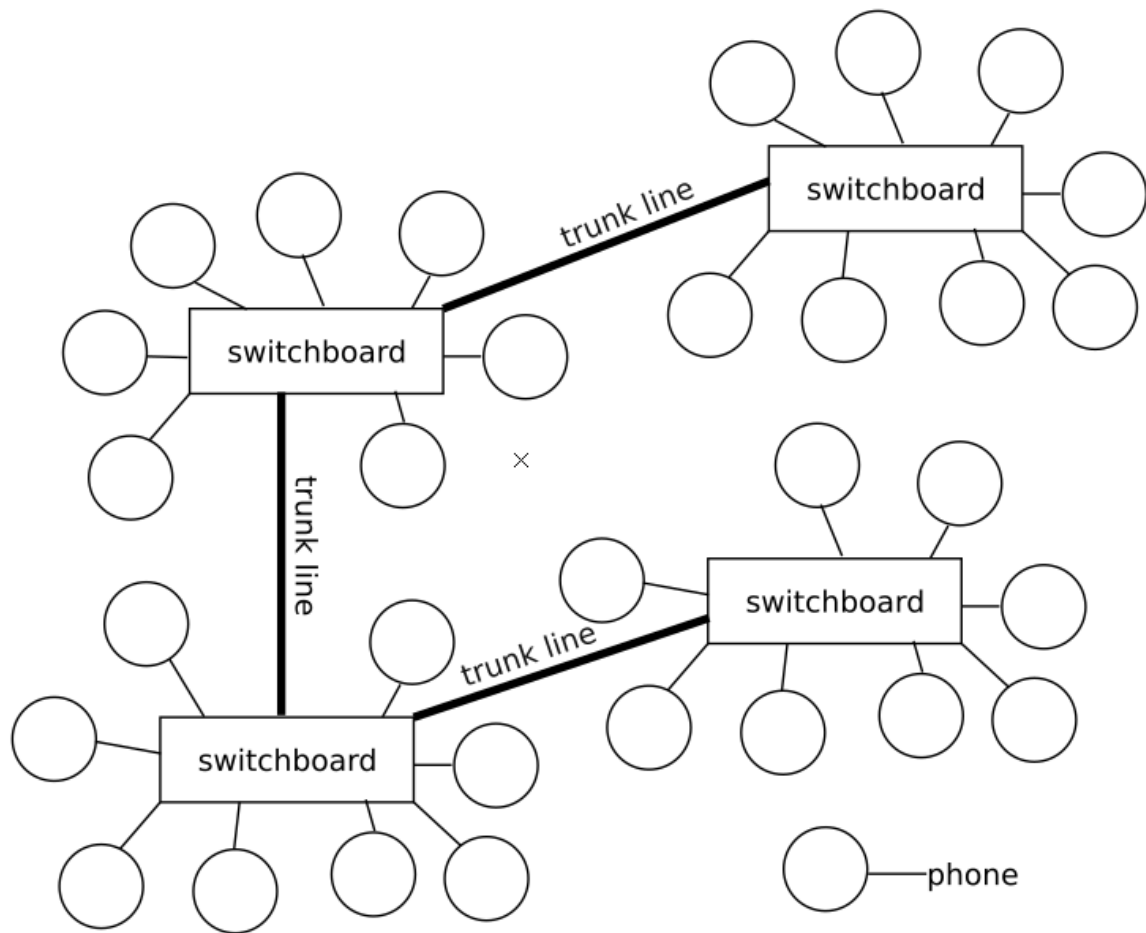
Like the old days before cell phones, phones will have an area code, which is permitted to be any positive number of digits and a phone number, which is permitted to be any positive number of digits.

In order to connect a phone to another phone, if it's a local number in the same area code, it can connect through its local switchboard. On the other hand, if it's a long distance number, it has to connect through the connected switchboards.



Here's an old switchboard system.

## A Sample Diagram of Our Network



□

Trunk lines allow us to connect between switchboards and each phone is connected to exactly one switchboard (and has exactly one area code).

In our network, there is a 1-to-1 correspondence between switchboards and area codes. (I.e. each switchboard has one area code attached, and that area code is fully handled by that board.)

# Implementation Details

## switch-add

```
switch-add [area-code-1]
```

This will create a new switchboard with the area code specified. The braces are just to indicate that it needs to be replaced with an area code which is a number. If the switchboard exists, you don't create a new one.

## switch-connect

```
switch-connect [area-code-1] [area-code-2]
```

This connects the switchboard at [area-code-1] with the one at [area-code-2], and also the reverse connection, which means that they are connected to each other. Calls can flow in both directions.

## phone-add

```
phone-add [area-code-1]-[num_part_1]-[num_part_2]
```

phone-add should add a phone number with the area code specified as well as the phone number with one hyphen between the area code and the phone number, but there can be as many hyphens between any other part of the number. The rest of the number can be combined, or kept as a format with hyphens.

## start-call

```
start-call [phone_number_1] [phone_number_2]
```

### **Connecting a call requires a recursive function.**

start-call should create a connection between the two phone numbers, if the area codes exist, the numbers exist at their proper area codes, and if they are not already in a phone call. It can only be connected if there is a path along switchboards between the two numbers. It is possible that no connection will exist because the two switchboards could not be connected by "trunk lines."

### end-call

end-call [phone\_number\_1]

end-call should disconnect the two numbers that are connected. The disconnection can occur at either end of the call. If there's no connection from that number, then report that but you don't need to do anything else.

### display

display

The display command should output each switchboard with its area-code. Then output the other area codes/switchboards that it's connected to. Finally output each local phone number and if it is on the hook, or if it's connected to another phone. See the sample output for more on how I think it should generally look to make it readable for the console output.

### network-save

network-save [filename]

This should save the network in a file. You can choose the format that you use, and you are permitted to use csv, json packages if you wish. You must decide on the file format, which must be able to be saved, and then loaded in a different run of the program. The structure of the network should be saved, but the phone to phone connections can be lost (pretend that all phones are hung up at the start of the load).

### network-load

network-load [filename]

This should load the file at file-name. It should create the network described in the file. Remember that you have to specify the file format, so you'll need to decide how to save, and how to load. When you load a

network, you should delete the old network or overwrite it, whichever makes sense for your project.

## Sample Output 1

```
linux3[1729]% python3 network.py
Enter command: switch-add 443
Enter command: switch-add 410
Enter command: switch-add 656
Enter command: display
Switchboard with area code: 443
    Trunk lines are:
    Local phone numbers are:
Switchboard with area code: 410
    Trunk lines are:
    Local phone numbers are:
Switchboard with area code: 656
    Trunk lines are:
    Local phone numbers are:
Enter command: switch-connect 443 410
Enter command: phone-add 656-112-3412
Enter command: phone-add 443-132-1332
Enter command: display
Switchboard with area code: 443
    Trunk lines are:
        Trunk line connection to: 410
    Local phone numbers are:
        Phone with number: 1321332 is not in use.
Switchboard with area code: 410
    Trunk lines are:
        Trunk line connection to: 443
    Local phone numbers are:
Switchboard with area code: 656
    Trunk lines are:
    Local phone numbers are:
        Phone with number: 1123412 is not in use.
Enter command: start-call 656-112-3412 443-132-1332
656-112-3412 and 443-132-1332 were not connected.
Enter command: switch-connect 656 410
Enter command: start-call 656-112-3412 443-132-1332
```

```
656-112-3412 and 443-132-1332 are now connected.
Enter command: display
Switchboard with area code: 443
    Trunk lines are:
        Trunk line connection to: 410
    Local phone numbers are:
        Phone with number: 1321332 is connected to 656-
1123412
Switchboard with area code: 410
    Trunk lines are:
        Trunk line connection to: 443
        Trunk line connection to: 656
    Local phone numbers are:
Switchboard with area code: 656
    Trunk lines are:
        Trunk line connection to: 410
    Local phone numbers are:
        Phone with number: 1123412 is connected to 443-
1321332
Enter command: network-save sample1.net
Network saved to sample1.net.
Enter command: quit
```

## Sample Output 2

```
linux3[1730]% python3 network.py
Enter command: network-load test.net
Network loaded from test.net.
Enter command: display
Switchboard with area code: 310
    Trunk lines are:
        Trunk line connection to: 410
    Local phone numbers are:
        Phone with number: 2222222 is not in use.
        Phone with number: 5555555 is not in use.
        Phone with number: 1111111 is not in use.
        Phone with number: 1231233 is not in use.
Switchboard with area code: 410
    Trunk lines are:
        Trunk line connection to: 310
        Trunk line connection to: 443
    Local phone numbers are:
```

```
Phone with number: 2233333 is not in use.
Phone with number: 3453456 is not in use.
Switchboard with area code: 443
Trunk lines are:
Trunk line connection to: 410
Local phone numbers are:
Phone with number: 9109191 is not in use.
Switchboard with area code: 545
Trunk lines are:
Local phone numbers are:
Phone with number: 1231234 is not in use.
Switchboard with area code: 223
Trunk lines are:
Local phone numbers are:
Phone with number: 1231234 is not in use.
Enter command: start-call 223-1231234 410-223-3333
223-1231234 and 410-223-3333 were not connected.
Enter command: start-call 410-223-3333 310-555-5555
410-223-3333 and 310-555-5555 are now connected.
Enter command: start-call 310-222-2222 310-111-1111
310-222-2222 and 310-111-1111 are now connected.
Enter command: display
Switchboard with area code: 310
Trunk lines are:
Trunk line connection to: 410
Local phone numbers are:
Phone with number: 2222222 is connected to 310-
1111111
Phone with number: 5555555 is connected to 410-
2233333
Phone with number: 1111111 is connected to 310-
2222222
Phone with number: 1231233 is not in use.
Switchboard with area code: 410
Trunk lines are:
Trunk line connection to: 310
Trunk line connection to: 443
Local phone numbers are:
Phone with number: 2233333 is connected to 310-
5555555
Phone with number: 3453456 is not in use.
Switchboard with area code: 443
Trunk lines are:
```

```
Trunk line connection to: 410
Local phone numbers are:
  Phone with number: 9109191 is not in use.
Switchboard with area code: 545
Trunk lines are:
Local phone numbers are:
  Phone with number: 1231234 is not in use.
Switchboard with area code: 223
Trunk lines are:
Local phone numbers are:
  Phone with number: 1231234 is not in use.
Enter command: end-call 310-111-1111
Hanging up...
Connection Terminated.
Enter command: end-call 545-123-1234
Unable to disconnect.
Enter command: end-call 410-555-5555
Enter command: display
Switchboard with area code: 310
Trunk lines are:
  Trunk line connection to: 410
Local phone numbers are:
  Phone with number: 2222222 is not in use.
  Phone with number: 5555555 is connected to 410-
2233333
  Phone with number: 1111111 is not in use.
  Phone with number: 1231233 is not in use.
Switchboard with area code: 410
Trunk lines are:
  Trunk line connection to: 310
  Trunk line connection to: 443
Local phone numbers are:
  Phone with number: 2233333 is connected to 310-
5555555
  Phone with number: 3453456 is not in use.
Switchboard with area code: 443
Trunk lines are:
  Trunk line connection to: 410
Local phone numbers are:
  Phone with number: 9109191 is not in use.
Switchboard with area code: 545
Trunk lines are:
Local phone numbers are:
```



```
Phone with number: 1231234 is not in use.  
Switchboard with area code: 223  
Trunk lines are:  
Local phone numbers are:  
Phone with number: 1231234 is not in use.  
Enter command: quit
```