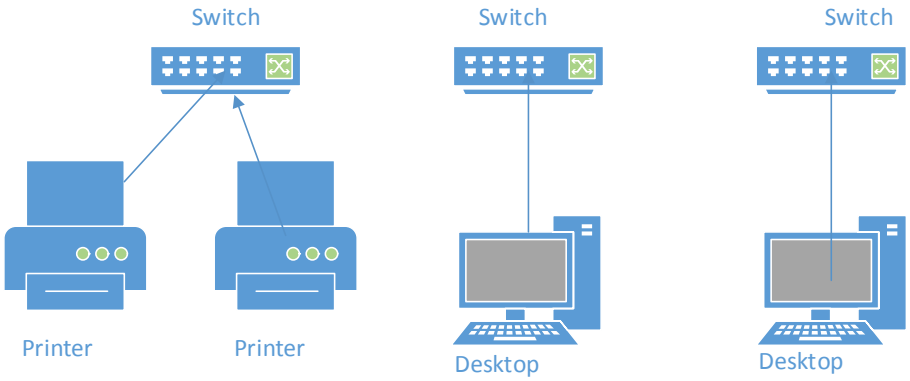
Portnox CORE development team. Interview for position: C# developer.

Contents

Task Description.

Your organization network consists of switches. Each switch has number of ports. To each port in the one moment of time can be connected one device only (laptop/desktop/printer, etc.) See below diagram.



Your network administrator manages NetworkEvents table with next fields (see example of NetworkEvents table below):

- Event_Id. Unique ID of event. Type: integer
- Switch_Ip. IP address of switch. Type: string
- Port_Id. Number of switch port (within parent switch). Type: integer
- Device_Mac. MAC address of device. Type: string.

Each time something happens in the network (e.g. device connected to switch, device disconnected from switch, switch port disabled, etc.), network events table updated with new row.

For example, for event “device connected to port (ID 1001)” next row will be added to table:

Event_Id	Switch_Ip	Port_Id	Device_Mac
1001	1.1.1.1	12	0101AFDC00BB

For example, for event “device disconnected from port (ID 1002)” next row will be added to table:

Event_Id	Switch_Ip	Port_Id	Device_Mac
1002	1.1.1.1	12	NULL

For example, for event “switch port disabled (ID 1003)” next row will be added to table:

Event_Id	Switch_Ip	Port_Id	Device_Mac

1003	1.1.1.1	12	NULL

Example of NetworkEvents Table

Event_Id	Switch_Ip	Port_Id	Device_Mac	Remarks
1001	1.1.1.1	12	AABBCC000001	New device was added to port 12 of switch 1.1.1.1
1001	1.1.1.1	11	AABBCC000009	New device was added to port 12 of switch 1.1.1.1
1003	192.168.1.1	48	NULL	Port 48 of switch 192.168.1.1 was disabled
1002	1.1.1.1	12	NULL	Device was removed from port 12 of switch 1.1.1.1
1001	192.168.1.1	47	AABBCC000001	New device was added to port 47 of switch 192.168.1.1

Task Precondition

Implement algorithm, which scans the table and translates it into collection of switches, where:

- Each switch contains collection of ports and collection of events (where this switch was involved).
- Each switch port contains collection of devices, which were connected to it at least once. Each device must be presented only once.
- Each switch port also contains collection of events (where this switch port was involved)
- Each device contains collection of events (where this device was involved together with switch and port)
- Each device can be connected to more than one port (For example laptop was connected to different conference rooms for a period of time and as a result more than one rows for same device, but different switches and ports will be added to the table). In this case each port device must contain only event where it was involved together with port.

Task steps

1. Create C# solution.
2. Create NetworkEvents table. You can use freeware MS SQL express.
    a. Create and attach SQL table creation script
    b. Fill table with random values. You can use table example above.
3. Implement classes/interfaces for Switch, Port and Device.
4. Implement classes/interfaces for data layer.
5. Implement table-to-collection translation algorithm.
6. Create tests (Unit tests, End-to-end tests. It is up to you). Use mocks to mock data layer behavior.
7. You project must be based on next programming principles:
    a. Use/show knowledge of OOP principles when defining all classes in the project.
    b. Use design patterns, when implement the algorithm.
    c. Use C# generics containers.
    d. Usage any 3rd party ORM/IOC/Tests frameworks are very welcome, but not mandatory.