

DOCUMENTATION ON SOLUTION

TRACK A MAC

GROUP-2

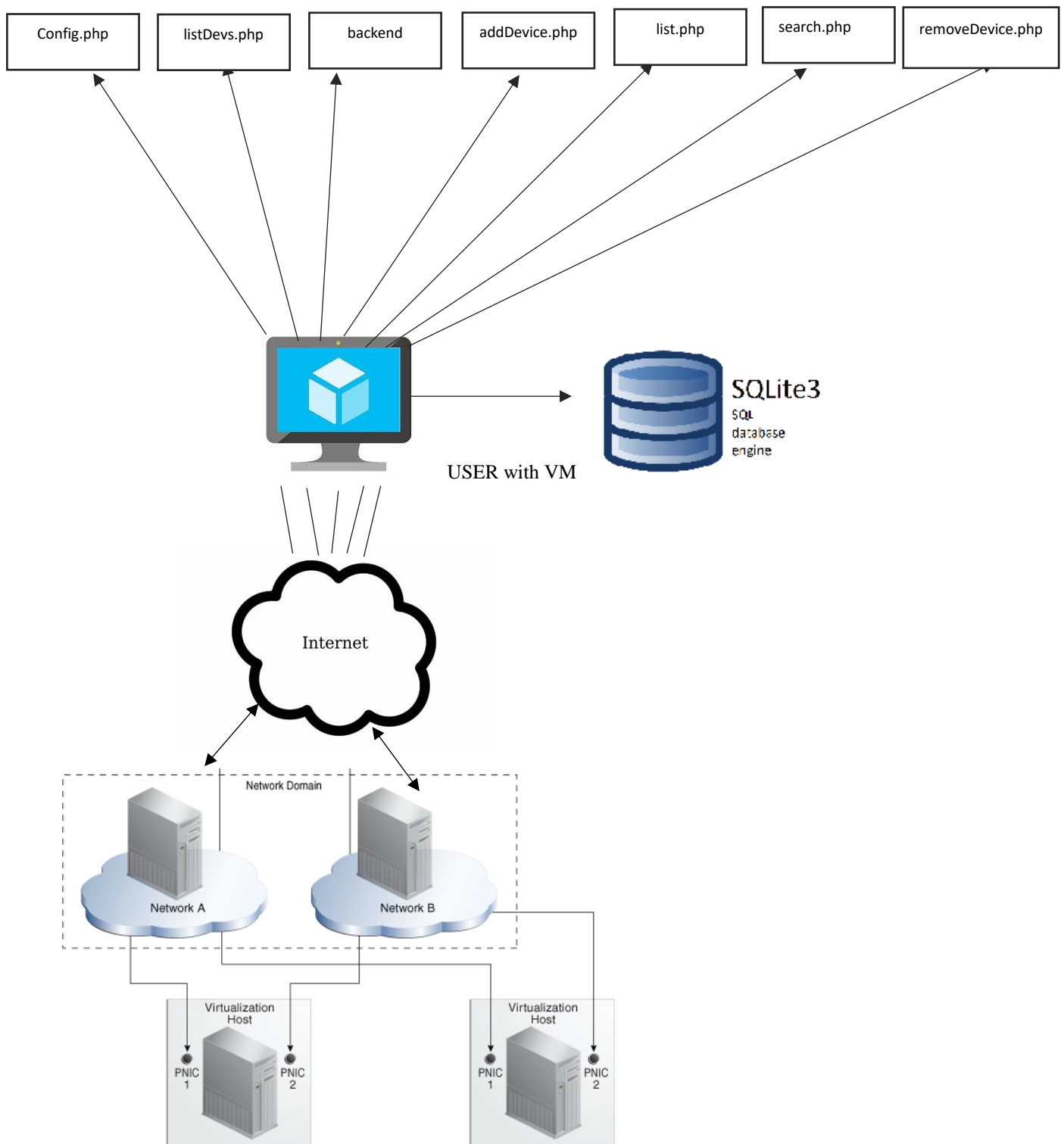
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1) Design



(Network domain consists of pool of switches, routers and other networking devices)

Fig 1: Design of project

Figure 1 is an design overview of the project which shows the relation between the network domain, internet, user with the virtual machine holding the solution within the source code and SQLite3 database.

This design describes how our solution tracks a MAC address by probing the network switches periodically and then retrieving their forwarding tables which will be stored in a database. Later we use a HTTP API for interaction between the php scripts and database.

2) Installation

A) System Requirements

- (i) Clean Ubuntu Server
- (ii) pip
- (iii) git (version control)
- (iv) curl
- (v) Python3
- (vi) PHP
- (vii) SQLite3
- (viii) PHP with SQLite3
- (ix) SQLite3 browser for manual testing
- (x) SNMP agent in Ubuntu
- (xi) Easysnmp module

B) Installation Steps

- (i) Clean Ubuntu Server

Using Virtual Machine to have Linux OS or creating an instance in OpenStack cloud environment to launch a Ubuntu Server.

- (ii) Git

`sudo apt update`

`sudo apt install git`

Git is a distributed version control system for tracking changes in source code in a central repository. Group members use this tool to commit and push the respective script files.

- (iii) Curl

`git clone https://github.com/curl/curl.git`

“Curl is a command line tool for transferring data specified with URL syntax”. In our project we use curl with php files .

As an example:

`curl" http://localhost:5000/addDevice.php?ip=192.168.184.21&port=161&community=public&version=2"`

(iv) Python3

```
sudo apt-get update
```

```
sudo apt-get install python3.6
```

Backend script is written in python to probe an snmp agent.

(v) pip

```
sudo apt install python3-pip
```

(vi) PHP

```
sudo apt-get install php
```

Frontend scripts is written in PHP and it is an requirement to execute php files in Ubuntu server.

(vii) SQLite3

```
sudo apt-get install sqlite3
```

(viii) PHP with SQLite3

```
sudo apt-get install php7.3-sqlite3
```

(ix) SQLite3 browser for manual testing

```
sudo apt-get install sqlitebrowser
```

(x) SNMP agent in Ubuntu

```
sudo apt-get install snmp snmp-mibs-downloader
```

```
sudo apt-get install snmpd
```

(xi) Easysnmp module

```
sudo apt-get install gcc python-dev
```

```
pip install easysnmp
```

3) Principle Operation of the Solution

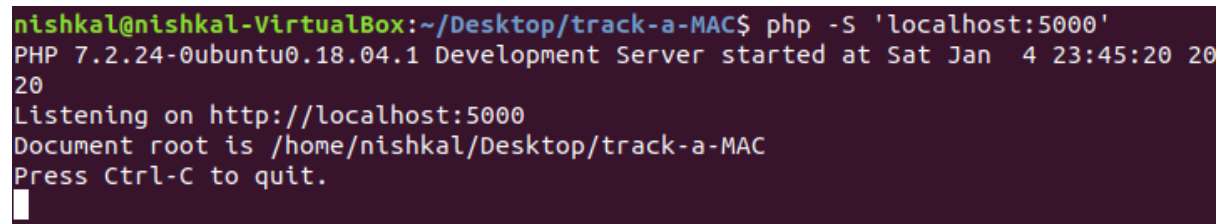
The solution has two parts (i) frontend scripts written in php, (ii) backend script written in python

- (i) Front end: There are 6 different php files and each file is executed with a particular operation and input syntax. Curl is used with a specified syntax for config.php, listDevs.php, addDevice.php, list.php, search.php, removeDevice.php . The role of curl is to transfer data using http API.

➔ First operation to do is :

php -S 'localhost:5000'

php -S is used to export RESTapi.

A screenshot of a terminal window with a dark background. The prompt is 'nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC\$'. The command entered is 'php -S 'localhost:5000''. The output shows 'PHP 7.2.24-0ubuntu0.18.04.1 Development Server started at Sat Jan 4 23:45:20 2020', 'Listening on http://localhost:5000', 'Document root is /home/nishkal/Desktop/track-a-MAC', and 'Press Ctrl-C to quit.'.

```
nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC$ php -S 'localhost:5000'
PHP 7.2.24-0ubuntu0.18.04.1 Development Server started at Sat Jan 4 23:45:20 2020
Listening on http://localhost:5000
Document root is /home/nishkal/Desktop/track-a-MAC
Press Ctrl-C to quit.
```

Fig 2: Execution of php -S in console.

➔Operation with config.php

curl 'http://127.0.0.1:5000/config.php'

Config is used to create a database and tables inside it.

➔Operation with addDevice.php

curl

'http://localhost:5000/addDevice.php?ip=192.168.184.21&port=161&community=public&version=2'

addDevice uses curl to transfer data from the user as input to the database where it is stored in a table, which is later retrieved by the backend for probing them.

➔Operation with listDevs.php:

curl '<http://127.0.0.1:5000/listDevs.php>'

It's role is to display the information of the devices added in the database along with it's probing time details.

→Operation with list.php

```
curl 'http://127.0.0.1:5000/list.php'
```

List dumps the devices information which includes port's and vlan's associated with the devices.

→Operation with search.php

Consider a mac address 00:0a:8a:93:42:82

```
curl 'http://localhost:5000/search.php?mac=00:0a:8a:93:42:82'
```

Used to display the port and vlans associated with a single networking device.

→Operation with removeDevice.php

```
curl
```

```
'http://localhost:5000/removeDevice.php?ip=192.168.184.21&port=161&community=public  
&version=2'
```

Removes the device information from the tables in the database.

(ii) Backend

Backend script is written in python and it is simply operated with

./backend. It's role is to probe the devices that are added in the database using addDevice.php . It later uses various oid's to check the vlan's and port's of the device that is being probed. It probes periodically at a time interval of 60 seconds.

4) Output

This section consists of outputs obtained after performing the operation.

The order of execution of the files is :

config.php → addDevice.php → listDevs.php → backend → listDevs.php → list.php → search.php → removeDevice.php

(i) config.php

```
nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC$ curl 'http://localhost:5000/co  
nfig.php'
```

(ii) addDevice.php

```
nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC$ curl 'http://localhost:5000/addDevice.php?ip=192.168.184.21&port=161&community=public&version=2'
```

→ OK nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC\$

(iii) listDevs.php

```
nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC$ curl 'http://127.0.0.1:5000/listDevs.php'
```

→ 192.168.184.21|161|public|2||0|

(iv) backend

it is executed as ./backend.

(v) listDevs.php which shows a response of firstprobe time and latestprobe time

```
nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC$ curl 'http://127.0.0.1:5000/listDevs.php'
```

→ 192.168.184.21|161|public|2|2020-01-04 23:49:17.044048|2020-01-04 23:49:17.265468|0|

(vi) list.php

A dump of database which shows the details of ip, vlan, port, Macs on port.

```
nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC$ curl 'http://127.0.0.1:5000/list.php'
```

```
|mgnt(184)|3|00:0a:8a:93:42:82,00:24:73:a0:a4:a0,00:50:c2:d2:81:5c,1e:36:36:f7:86:64,28:c6:8e:35:a6:78,a0:21:b7:c1:44:1e,c4:04:15:8b:ec:12
|mgnt(184)|1|00:10:74:67:5a:25,00:15:17:4d:de:3d,00:1a:e2:59:94:32,00:c0:b7:f4:5f:06,00:c0:b7:f4:5f:07,00:c0:b7:f4:5f:0e,00:c0:b7:f4:5f:18,08:f1:ea:98:e6:f0,28:29:86:26:cd:7b,70:10:6f:ca:f3:5a,bc:30:5b:cf:97:52,c4:04:15:8c:08:5c,c4:54:44:76:16:96
|mgnt(184)|25|00:15:17:4d:de:3f,28:c6:8e:35:a6:79,a0:21:b7:c1:44:1f,c4:04:15:8c:07:36
|mgnt(184)|54|00:16:3e:03:9d:a4,00:16:3e:16:bb:41,00:16:3e:22:72:62,00:16:3e:44:05:a7,00:16:3e:4e:72:5e,00:16:3e:6e:2a:27,00:16:3e:7f:90:4b,00:16:3e:84:b8:df,00:16:3e:85:6f:59,00:16:3e:8b:bd:49,00:16:3e:90:0b:d2,00:16:3e:90:14:00,00:16:3e:9d:a0:d0,00:16:3e:a5:e1:5c,00:16:3e:cd:87:76,00:16:3e:cf:a5:44,00:16:3e:d5:94:8f,00:16:3e:d9:61:2b,00:16:3e:e1:27:03,00:16:3e:fc:bd:92,00:18:8b:f8:2a:63,00:1a:e2:59:94:30,2c:60:0c:60:28:b5,5e:cb:93:24:cb:61,6e:c3:05:90:d8:f0,7e:41:54:02:6d:98,90:b1:1c:fd:04:1f,90:b1:1c:fd:1d:ed,a6:11:ff:18:f3:28,aa:50:b2:3b:13:59,b6:31:5a:4c:b5:46,b6:87:d6:08:81:a3,c4:04:15:8c:07:2a,ce:6c:84:c2:48:e1,f2:41:63:e0:07
```

(vii) search.php

```
nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC$ curl 'http://localhost:5000/search.php?mac=00:0a:8a:93:42:82'
```

→ 192.168.184.23 | mgnt(184) | 3 | 00:0a:8a:93:42:82

(viii) removeDevice.php

```
nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC$ curl 'http://localhost:5000/removeDevice.php?ip=192.168.184.21&port=161&community=public&version=2'
```

→ OK Removed nishkal@nishkal-VirtualBox:~/Desktop/track-a-MAC\$

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We would like to thank Dr.Patrik Arlos for assigning this group project and for clearing our doubts regarding the documentation and scripting. We would like to show our gratefulness in form of this acknowledgement.