Lab 7: SNMP PDU Formats

NET311 - Computer Network Management

Instructor: Dr. Mostafa Dahshan

Objectives

1. Deeper understanding of SNMPv2 and SNMPv3 protocols.
2. Analyzing the formats of different SNMPv2 and SNMPv3 PDUs.

References

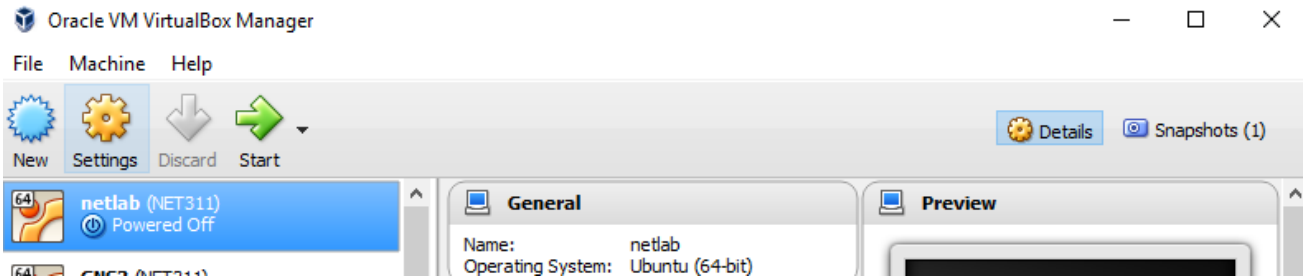
1. Using CORE Network Emulator GUI.
2. CORE Network Emulator: Video Tutorials.
3. CORE Network Emulator: Install Network Services.
4. Manpage of snmpd.conf Examples.
5. VACM: Net-snmp tutorials.
6. VACM (Access Control) configuration.
7. Manpage of snmpset.
8. Manpage of snmpbulkget.
9. netcat - Linuxintro.

Instructions

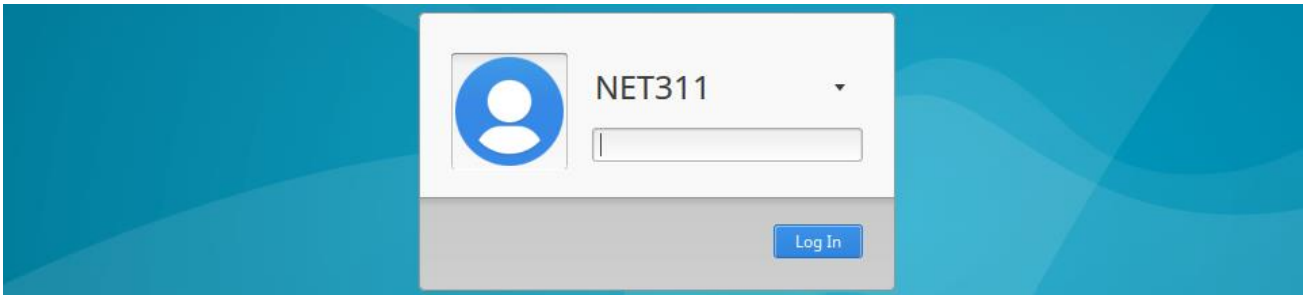
1. Read the lab instructions.
2. Provide question answers and screenshots in the supplied answer sheet.
3. After finishing the lab, upload your saved answer sheet to LMS.

Part 1: Start the Network Environment

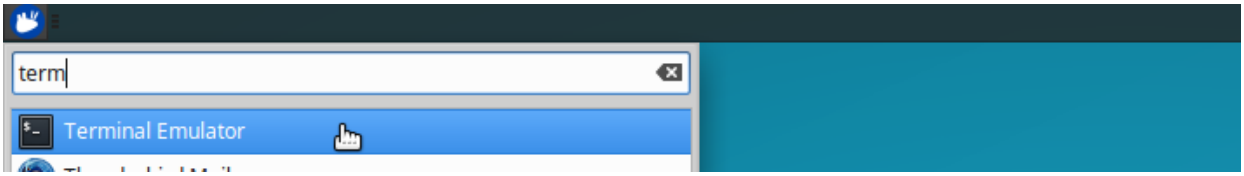
1. Start the netlab Linux virtual machine.



2. Login to the netlab Linux virtual machine using login: **net311** password: **abc.311**

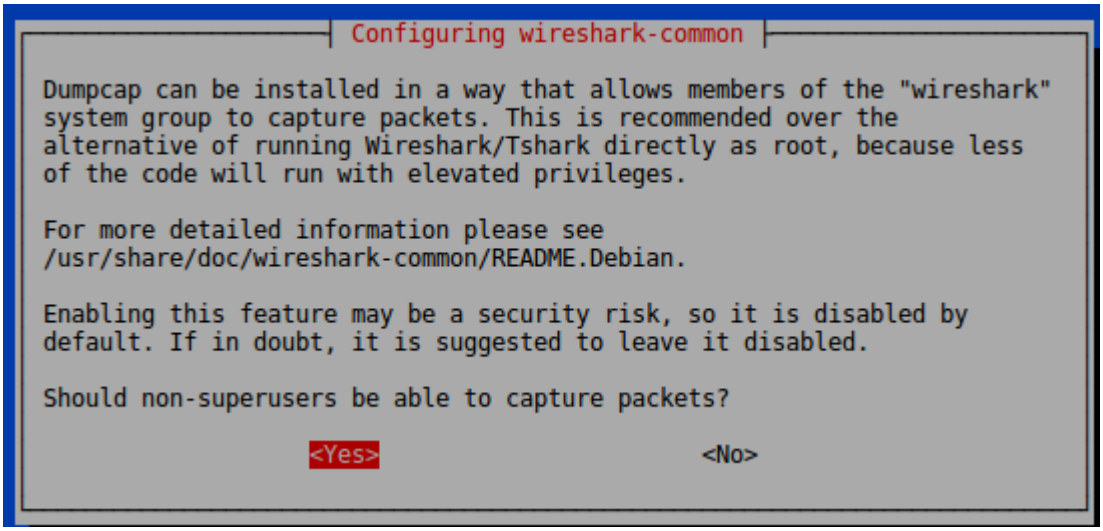


3. Run the **Terminal emulator**



4. To allow access to wireshark, run the following command

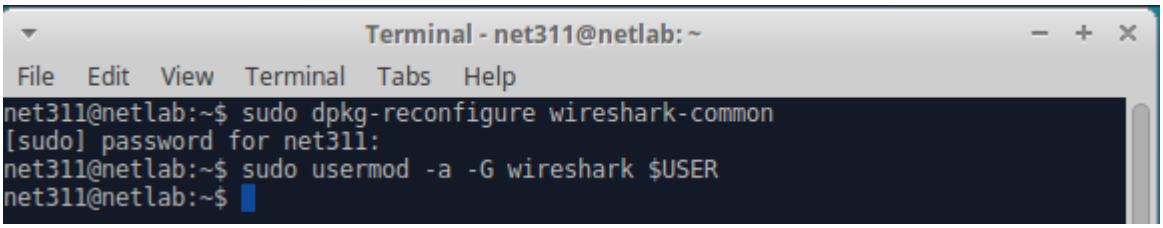
```
sudo dpkg-reconfigure wireshark-common
```



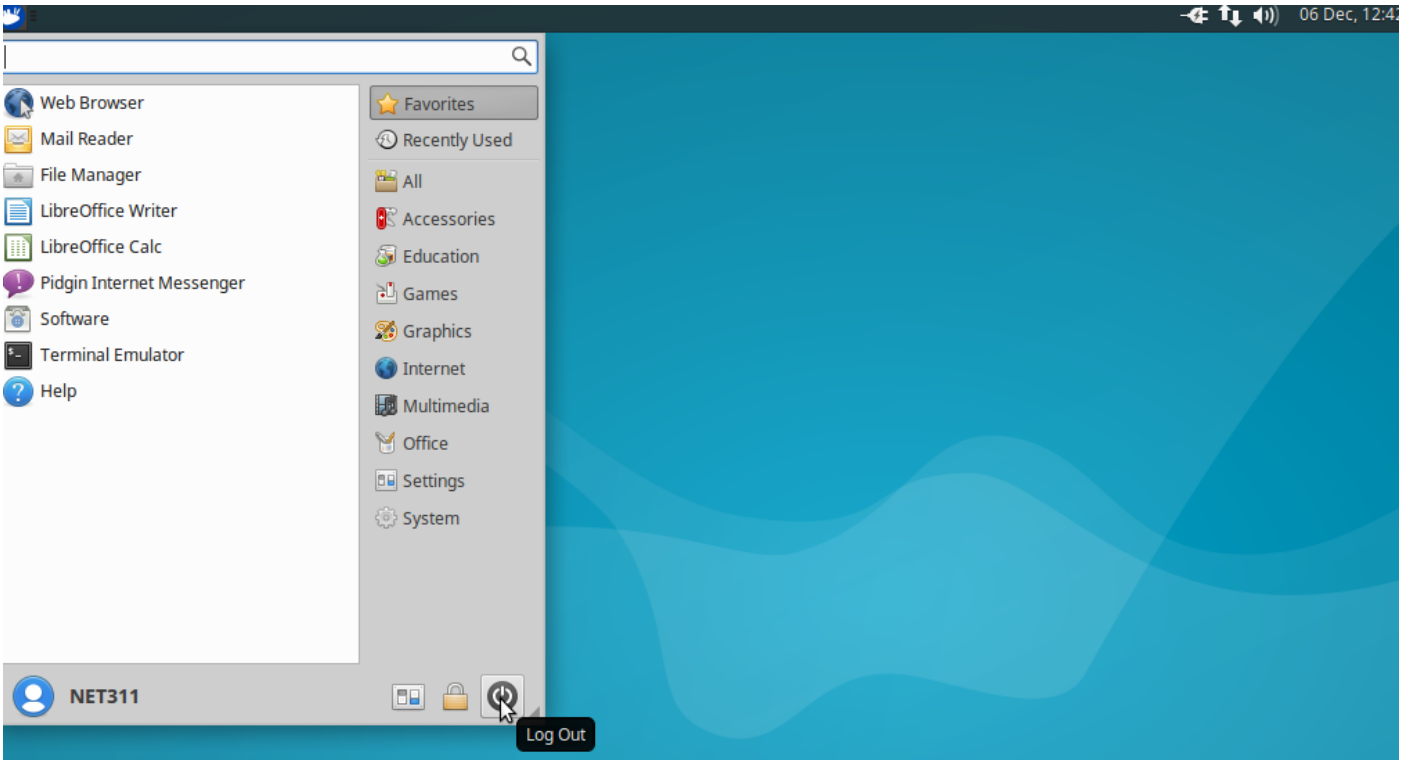
5. Click Yes.

6. Run the following command

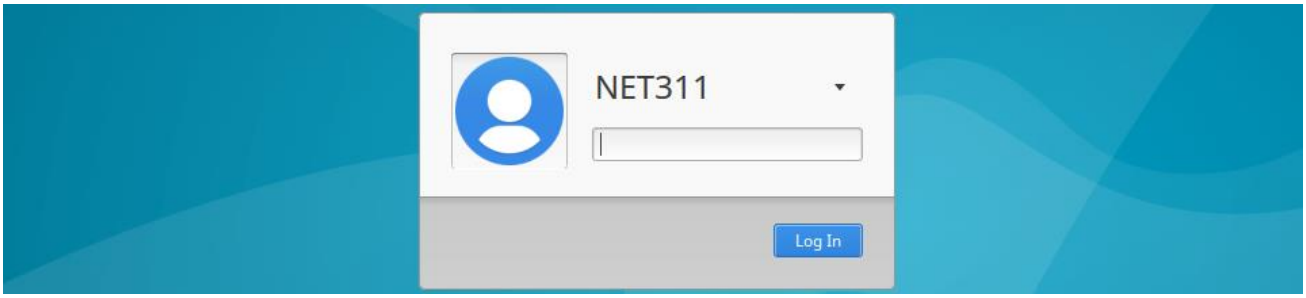
```
sudo usermod -a -G wireshark $USER
```



7. Log out.

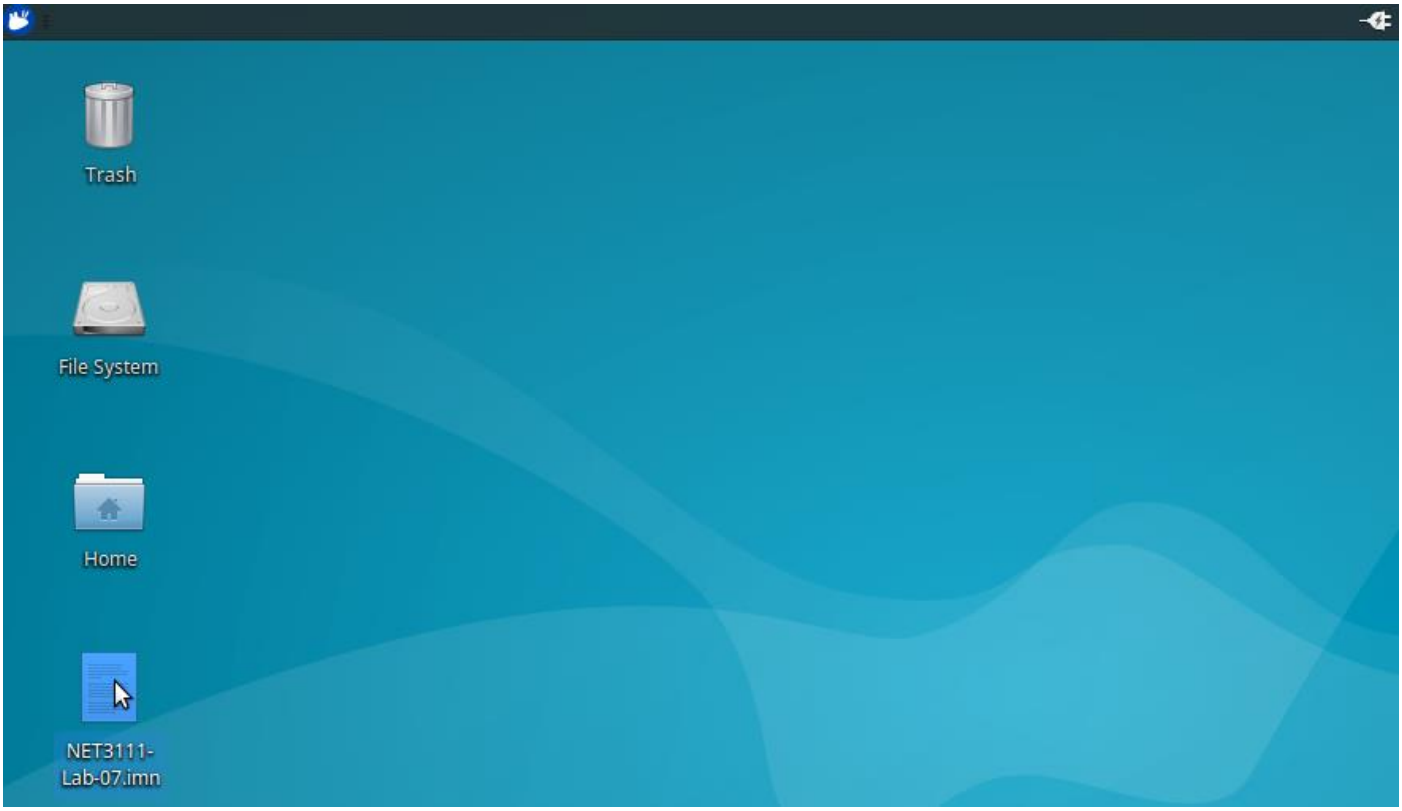


8. Log in again with the password: **abc.311**

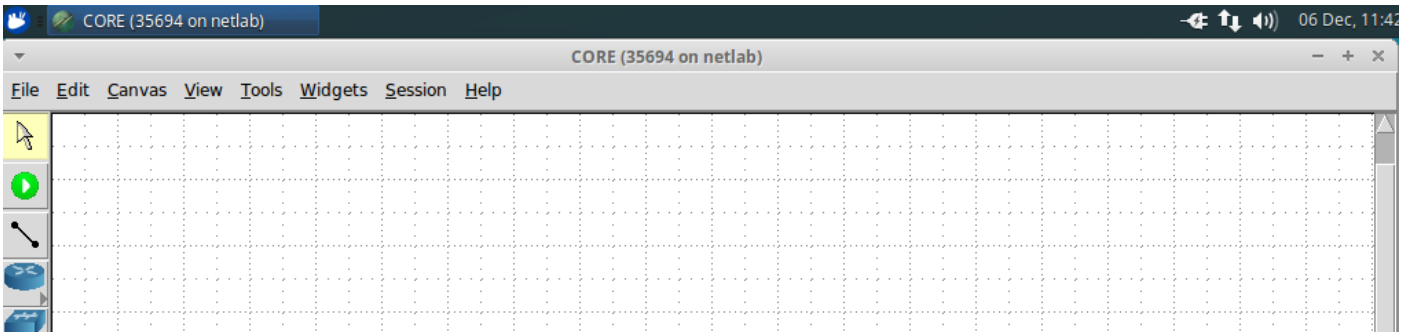


9. Locate the file **NET311-Lab-07.imn** included in the lab files. Copy the file to the desktop of the virtual machine.

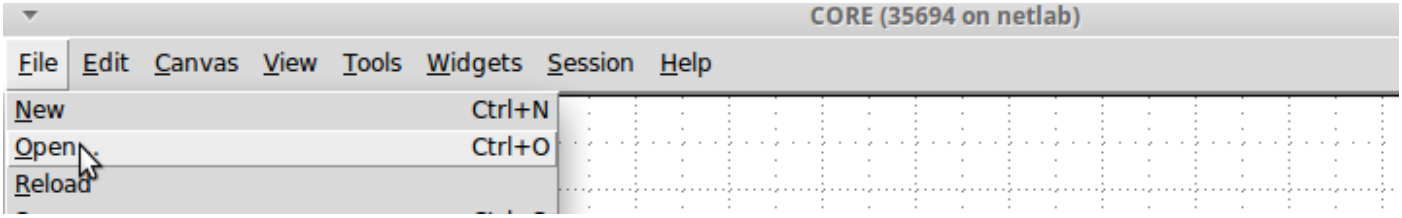
If you can't use drag-and-drop, you may copy the file contents into a text file using **Mousepad**. Save the new file under the Desktop folder with the name **NET311-Lab-07.imn**.

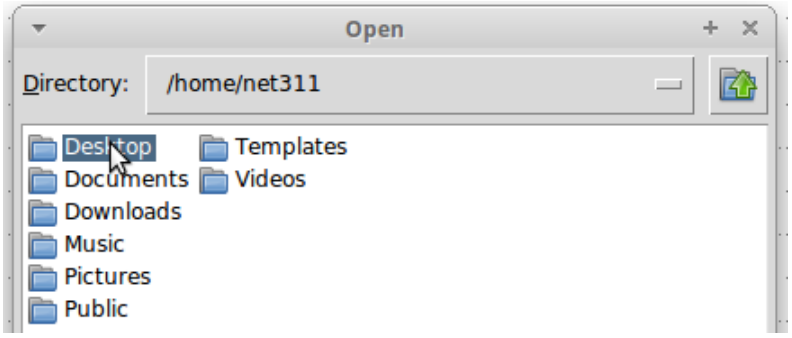


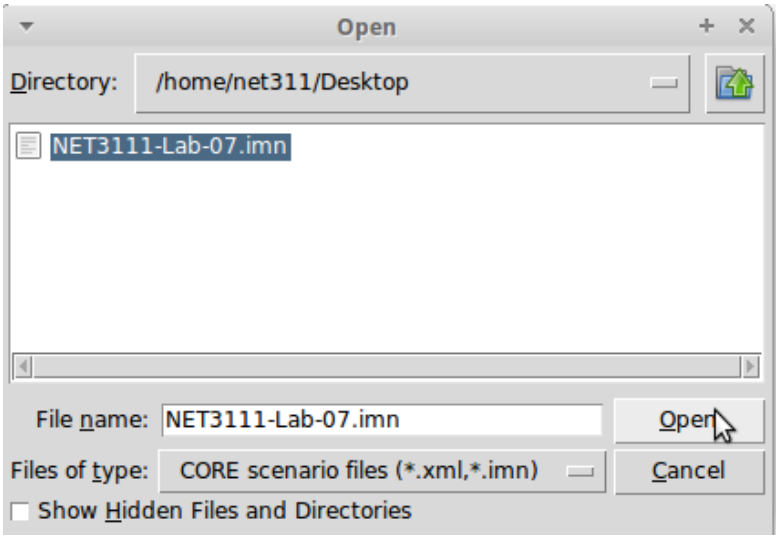
10. Run the CORE Network Emulator



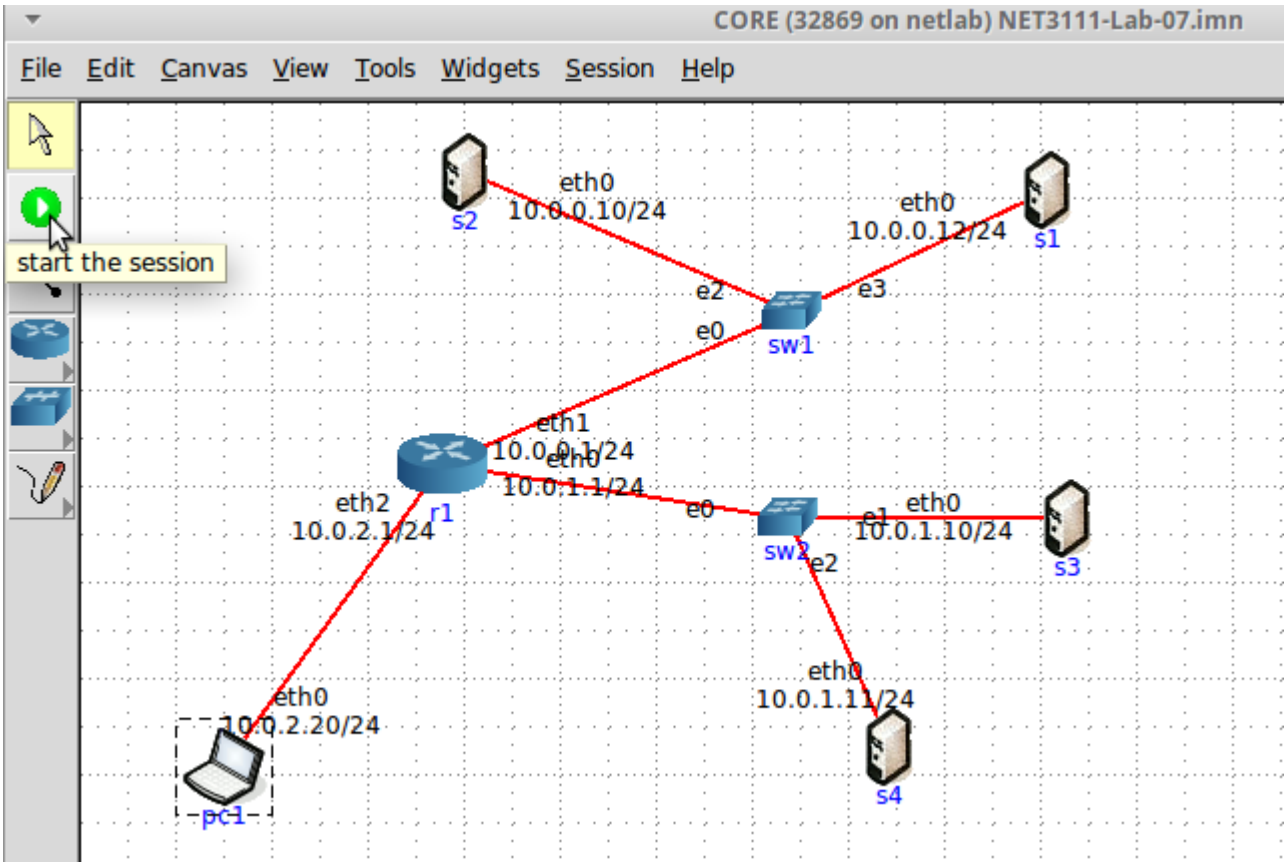
11. From the **File** menu, **open** the file **NET311-Lab-07.imn** from your Desktop folder.







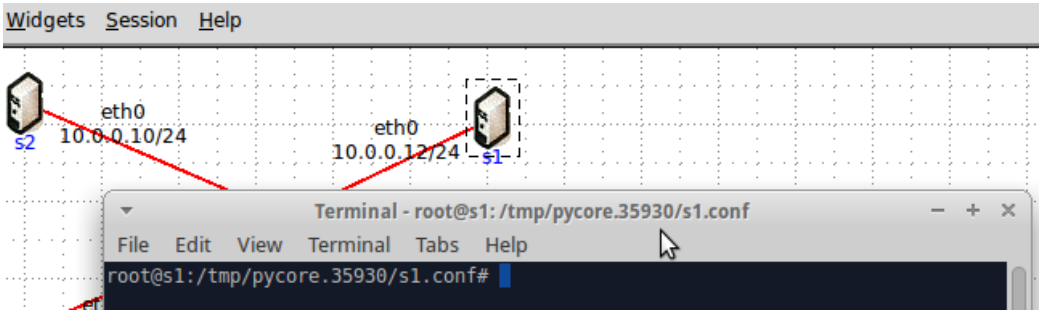
12. Click on the green button to start the session



Lab sheet 1.1: provide a screenshot showing the running network session.

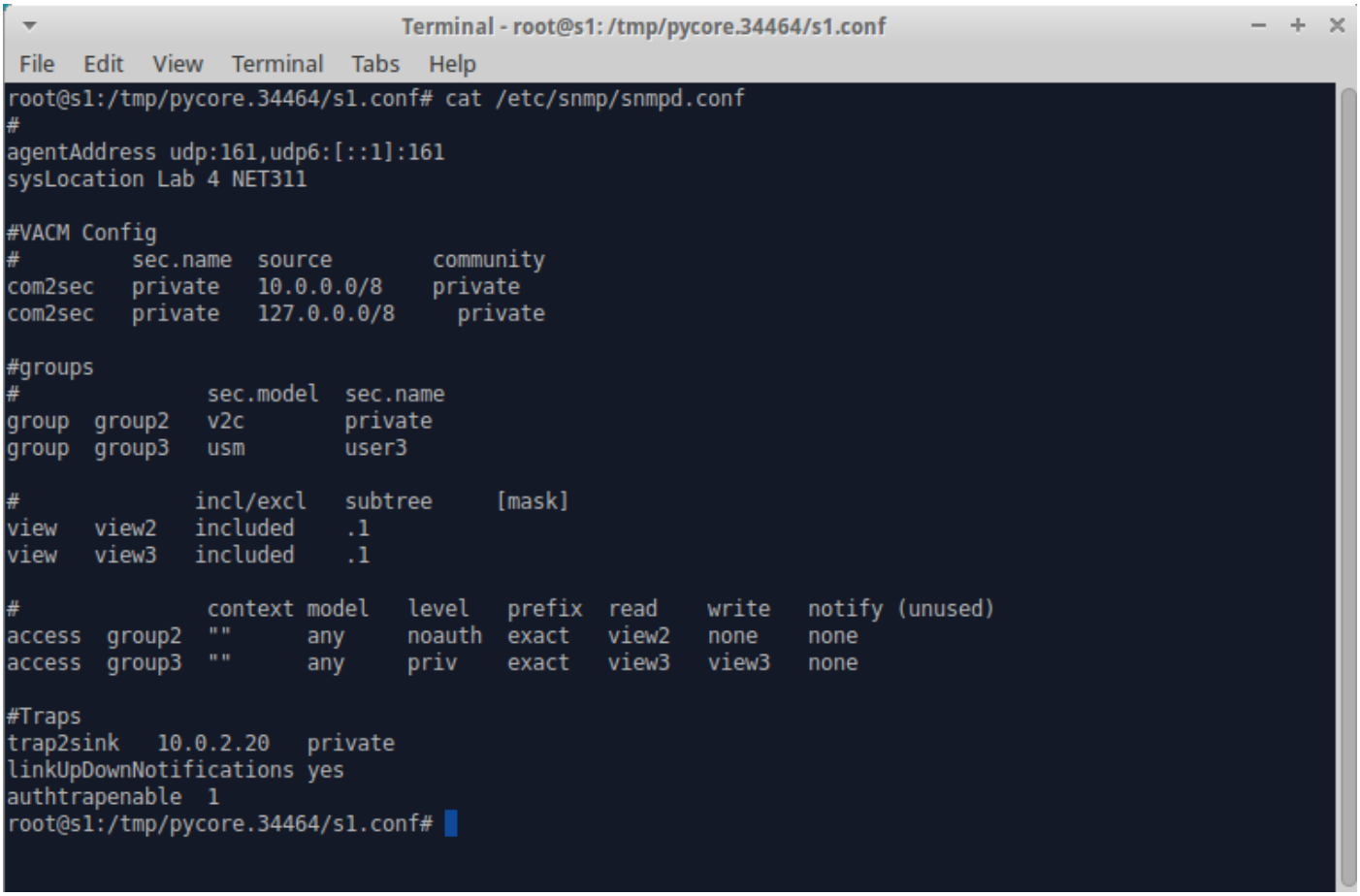
Part 2: Analyze SNMPv2 Get-Request and Set-Request PDUs

1. Double-click on server **s1** to access its terminal.



2. Review the contents of the file **/etc/snmp/snmpd.conf** on **s1**.

```
cat /etc/snmp/snmpd.conf
```

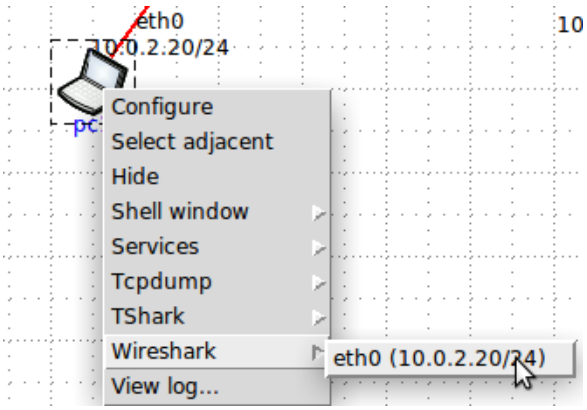


Lab sheet 2.1: provide a screenshot showing the contents of the /etc/snmp/snmpd.conf file on s1.

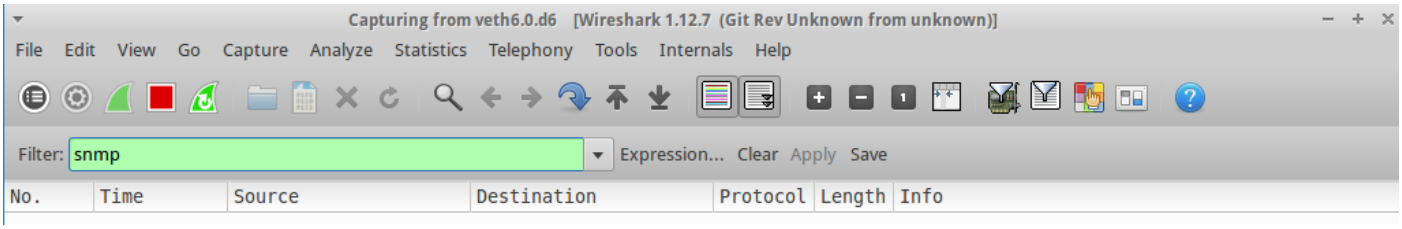
3. Review the contents of the file **/var/lib/snmp/snmpd.conf** on **s1**.

```
cat /var/lib/snmp/snmpd.conf
```

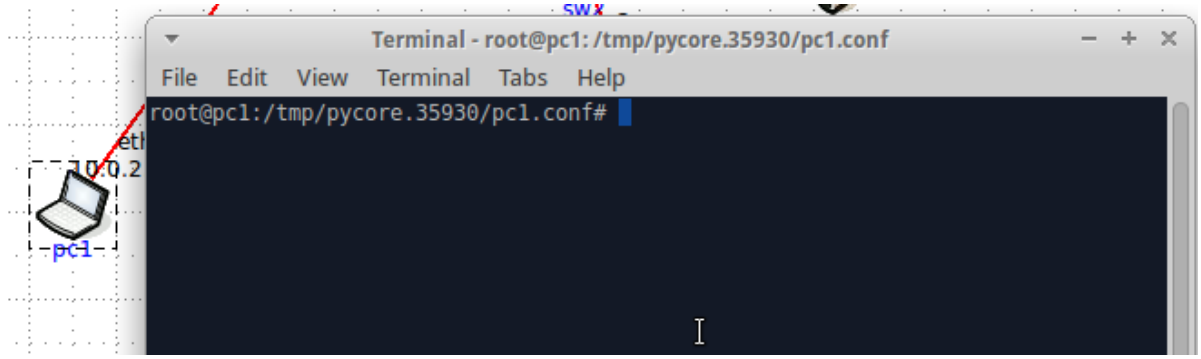
4. Right click on the host **pc1** to run **Wireshark** on the link **eth0**.



5. Enter snmp in the Filter input in Wireshark.

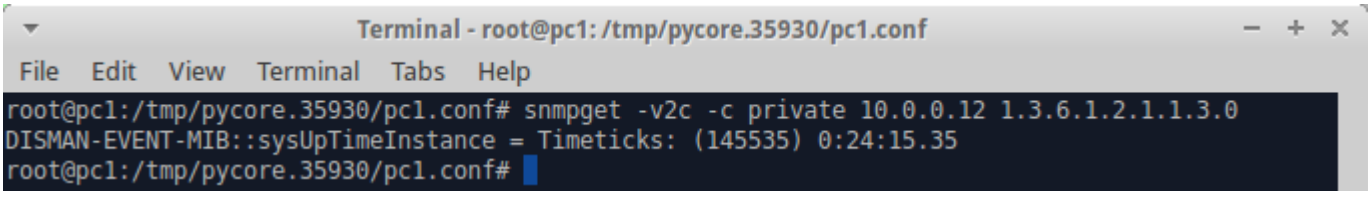


6. Double click on the host **pc1** to open its terminal.

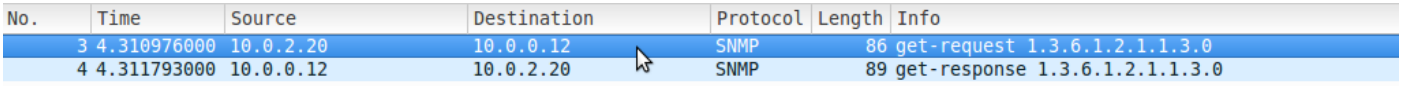


7. Send a get-request to host **s1** with a single OID (**sysUpTime**)

```
snmpget -v2c -c private 10.0.0.12 1.3.6.1.2.1.1.3.0
```



8. In Wireshark window, double click on the **get-request** line to inspect its contents



```
▾ Simple Network Management Protocol
    version: v2c (1)
    community: private
  ▾ data: get-request (0)
    ▾ get-request
        request-id: 956436173
        error-status: noError (0)
        error-index: 0
      ▾ variable-bindings: 1 item
        ▾ 1.3.6.1.2.1.1.3.0: Value (Null)
            Object Name: 1.3.6.1.2.1.1.3.0 (iso.3.6.1.2.1.1.3.0)
            Value (Null)
```

Lab sheet 2.2: write the values of the PDU fields of the SNMP get-request as indicated in the table.

Application Header	Version	Community	PDU Type	Request ID	Error Status	Error Index	VarBind 1 name	VarBind 1 value
SNMP								

9. In Wireshark window, double click on the **get-response** line to inspect its contents

```
No.  Time          Source       Destination  Protocol  Length  Info
     3 4.310976000 10.0.2.20    10.0.0.12    SNMP          86 get-request 1.3.6.1.2.1.1.3.0
     4 4.311793000 10.0.0.12    10.0.2.20    SNMP          89 get-response 1.3.6.1.2.1.1.3.0
```

```
▾ Simple Network Management Protocol
    version: v2c (1)
    community: private
  ▾ data: get-response (2)
    ▾ get-response
        request-id: 956436173
        error-status: noError (0)
        error-index: 0
      ▾ variable-bindings: 1 item
        ▾ 1.3.6.1.2.1.1.3.0: 145535
            Object Name: 1.3.6.1.2.1.1.3.0 (iso.3.6.1.2.1.1.3.0)
            Value (Timeticks): 145535
```

Lab sheet 2.3: write the values of the PDU fields of the SNMP get-response as indicated in the table.

Application Header	Version	Community	PDU Type	Request ID	Error Status	Error Index	VarBind 1 name	VarBind 1 value
SNMP								

Lab sheet 2.4: provide a screenshot showing the PDU fields of the SNMP get-response.

10. Send a **get-request** to host **s1** with a two OIDs (**sysUpTime, sysLocation**)

```
snmpget -v2c -c private 10.0.0.12 sysUpTime.0 sysLocation.0
```

```
root@pc1:/tmp/pycore.35930/pc1.conf# snmpget -v2c -c private 10.0.0.12 sysUpTime.0 sysLocation.
0
DISMAN-EVENT-MIB::sysUpTimeInstance = Timeticks: (228591) 0:38:05.91
SNMPv2-MIB::sysLocation.0 = STRING: Lab 4 NET311
root@pc1:/tmp/pycore.35930/pc1.conf#
```

11. In Wireshark window, double click on the **get-response** line to inspect its contents

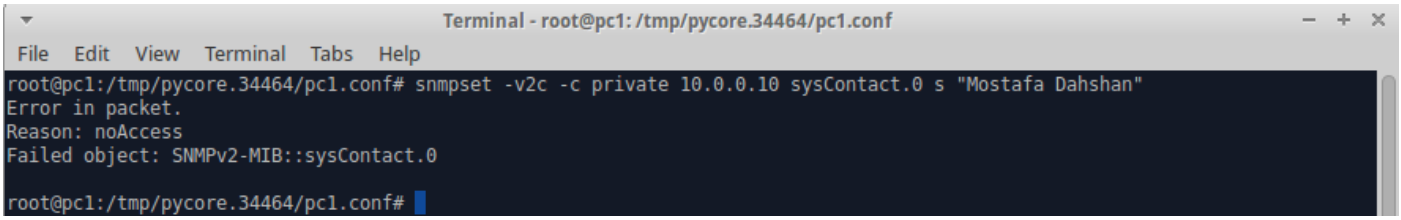
Lab sheet 2.5: write the values of the PDU fields of the SNMP get-response as indicated in the table.

Application Header	Version	Community	PDU Type	Request ID	Error Status	Error Index	VarBind 1 name	VarBind 1 value	VarBind 2 name	VarBind 2 value
SNMP										

12. Send a **set-request** to host **s2** with one OID (**sysContact.0=Your Name**).

```
snmpset -v2c -c private 10.0.0.10 sysContact.0 s "Mostafa Dahshan"
```

Note that this requests results in an error, because community **private** only has read access to the subtree .1.



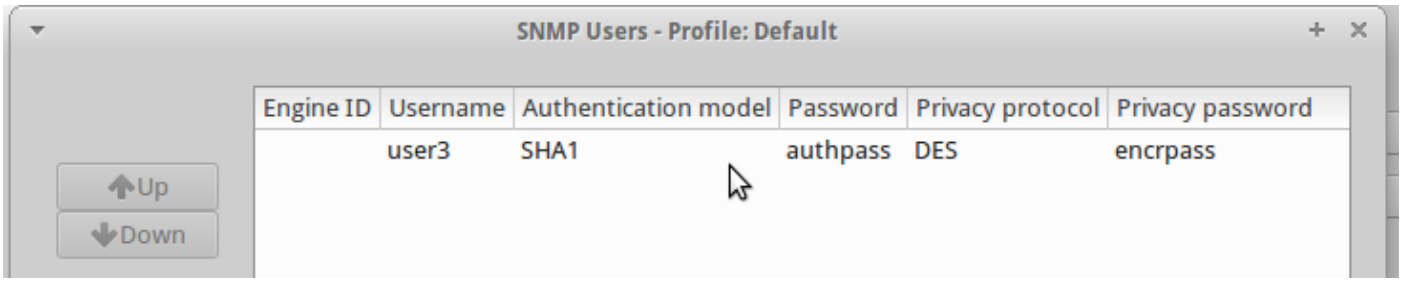
Lab sheet 2.6: write the values of the PDU fields of the SNMP get-response as indicated in the table.

Application Header	Version	Community	PDU Type	Request ID	Error Status	Error Index	VarBind 1 name	VarBind 1 value
SNMP								

Part 3: Analyze SNMPv2 GetBulk-Request and SNMPv3 Set-Request PDUs

1. On Wireshark, go to **Edit** > **Preferences** > **Protocols** > **SNMP**. Click on **Users Table**.

Configure the user **user3** with authentication password **authpass** and privacy password: **encrpass** for SNMP protocol.



2. Send a send-request to host **s2** with one OID (**sysContact.0=Your Name**), this time using SNMPv3 user **user3**.

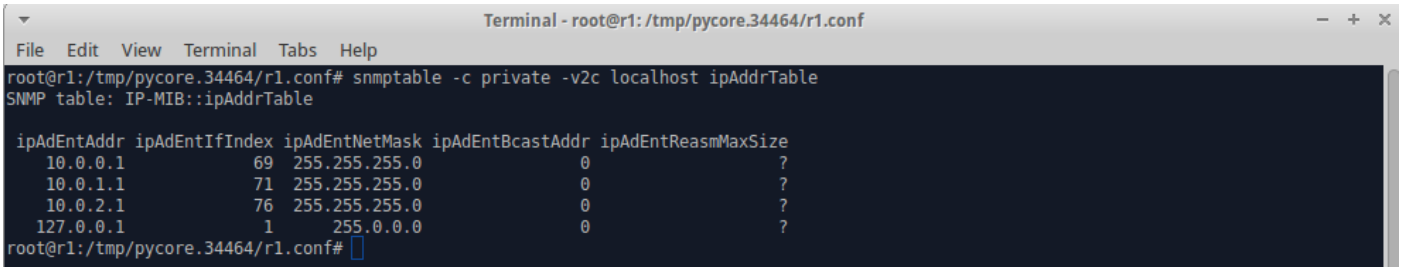
```
snmpset -v3 -u user3 -a SHA -A authpass -x DES -X encrpass -l authPriv
10.0.0.10 sysContact.0 s "Mostafa Dahshan"
```

```
root@pc1:/tmp/pycore.34464/pc1.conf# snmpset -v3 -u user3 -a SHA -A authpass -x DES -X encrpass -l authPriv 10.0.0.10 sysCon
tact.0 s "Mostafa Dahshan"
SNMPv2-MIB::sysContact.0 = STRING: Mostafa Dahshan
root@pc1:/tmp/pycore.34464/pc1.conf#
```

Lab sheet 3.1: provide a screenshot showing the output of the response to the set-request in Wireshark.

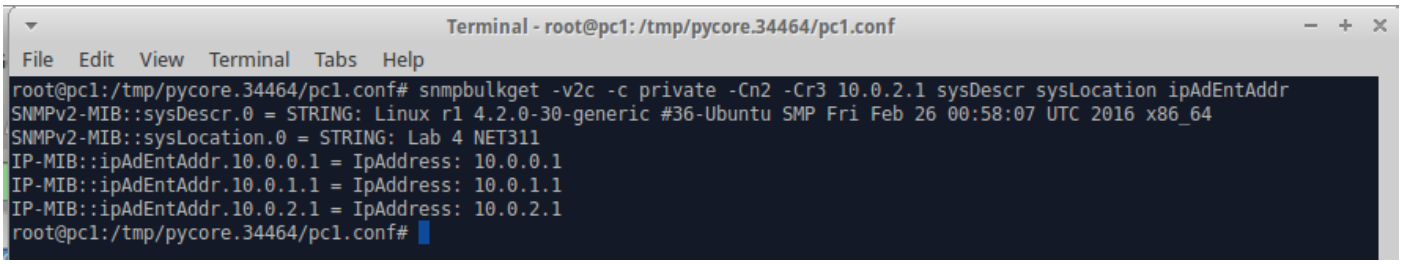
3. Double-click on router **r1**, then review the **ipAddrTable** using the following command:

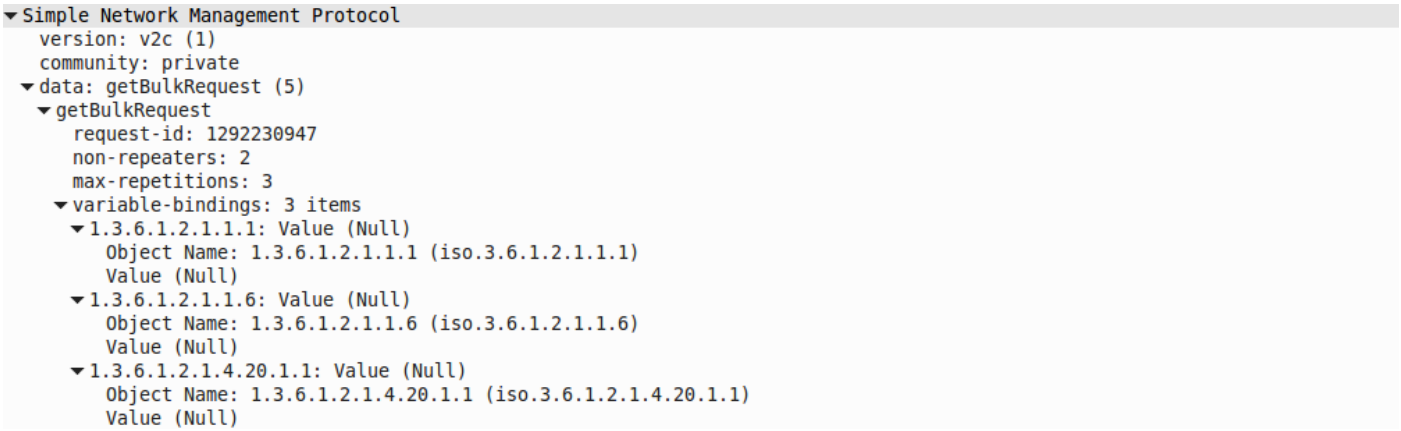
```
snmptable -c private -v2c localhost ipAddrTable
```



4. From **pc1**, send getbulk-request to r1 with **2** non-repetitive objects (**sysDescr**, **sysLocation**) and max-repetitions of **3** of the columnar object **ipAdEntAddr**.

```
snmpbulkget -v2c -c private -Cn2 -Cr3 10.0.2.1 sysDescr sysLocation ipAdEntAddr
```



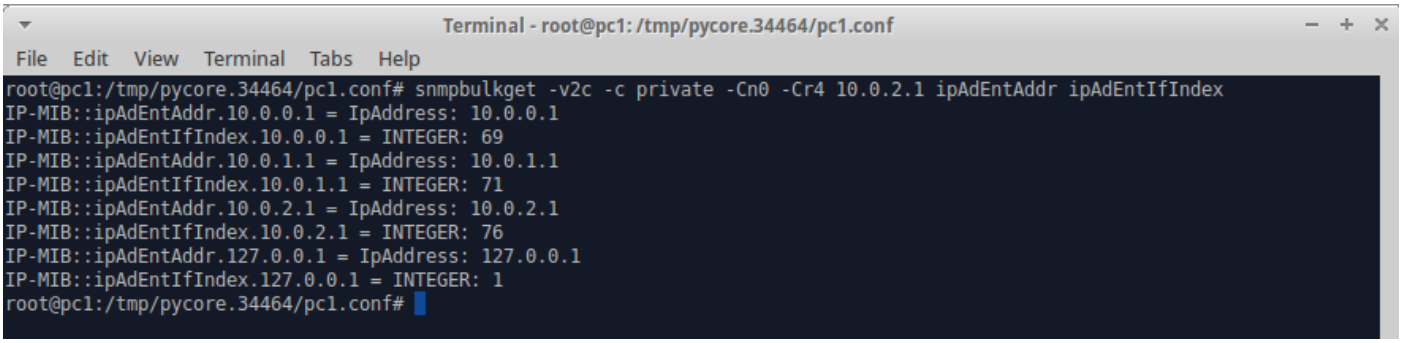


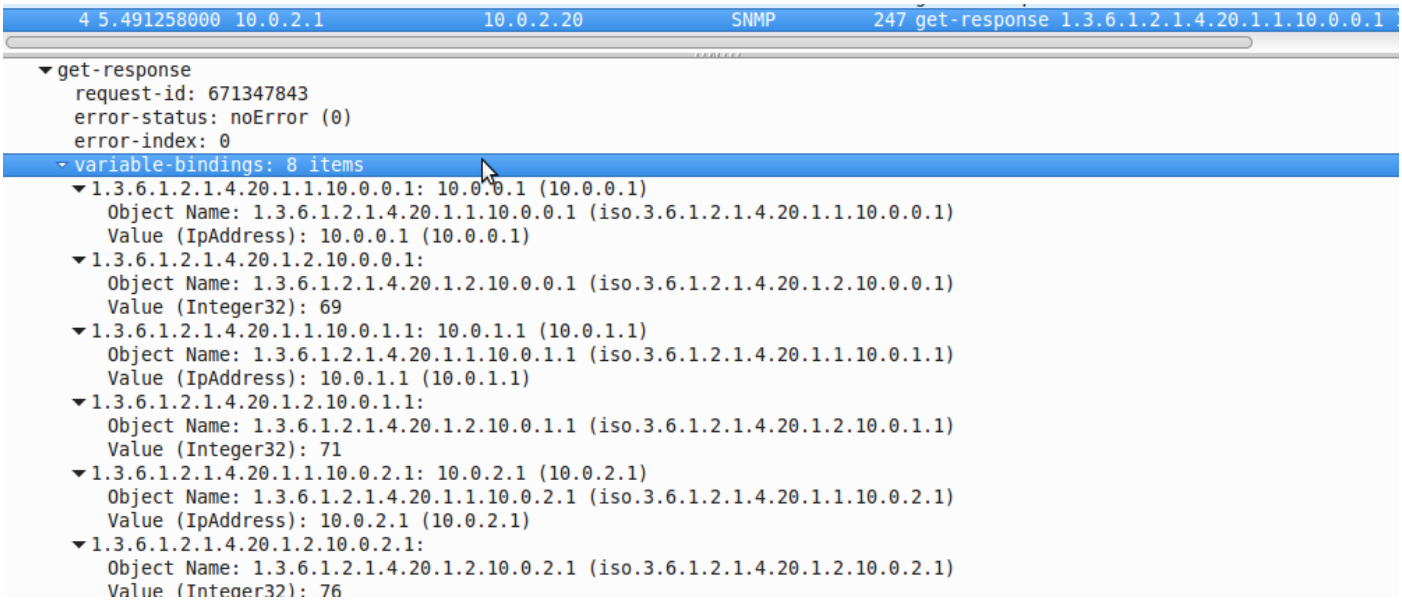
Lab sheet 3.2: write the values of the PDU fields of the SNMP get-response as indicated in the table.

Version	Community	PDU Type	Request ID	Non-repeaters	Max-repetitions	VarBind 1 name	VarBind 1 value	…	VarBind 3 name	VarBind 3 value

5. Send getbulk-request to r1 with **0** non-repetitive objects and max-repetitions of **4** of the two columns **ipAdEntAddr** and **ipAdEntIfIndex**.

```
snmpbulkget -v2c -c private -Cn0 -Cr4 10.0.2.1 ipAdEntAddr ipAdEntIfIndex
```



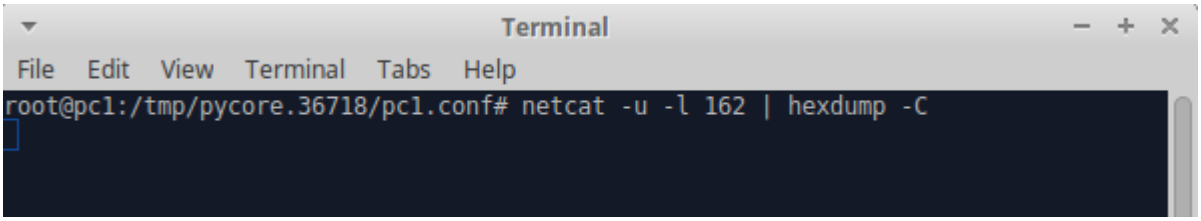


Lab sheet 3.3: provide a screenshot showing the output of the response to the getbulk-request in Wireshark.

Part 4: Analyze SNMPv2 Trap PDU

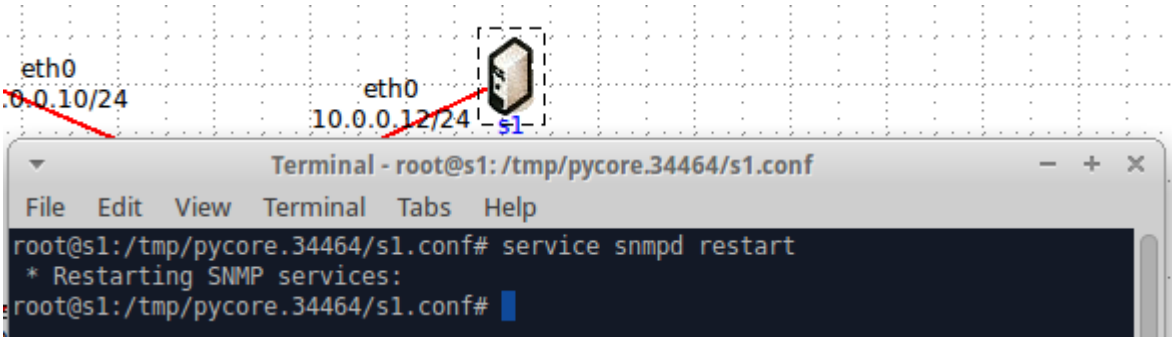
1. Double-click on host **pc1** to open a terminal, then write the following command to listen for snmp traps.

```
netcat -u -l 162 | hexdump -C
```

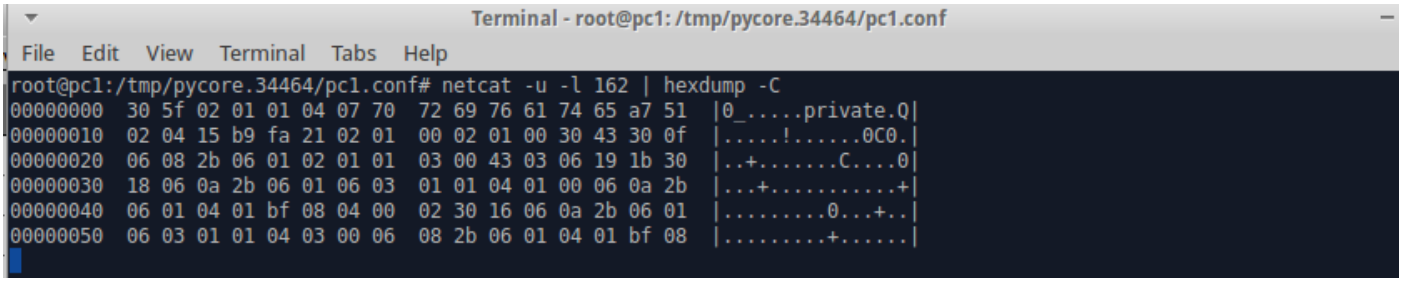


1. Double-click on host **s1** to open the terminal. Then write the following command to trigger a trap.

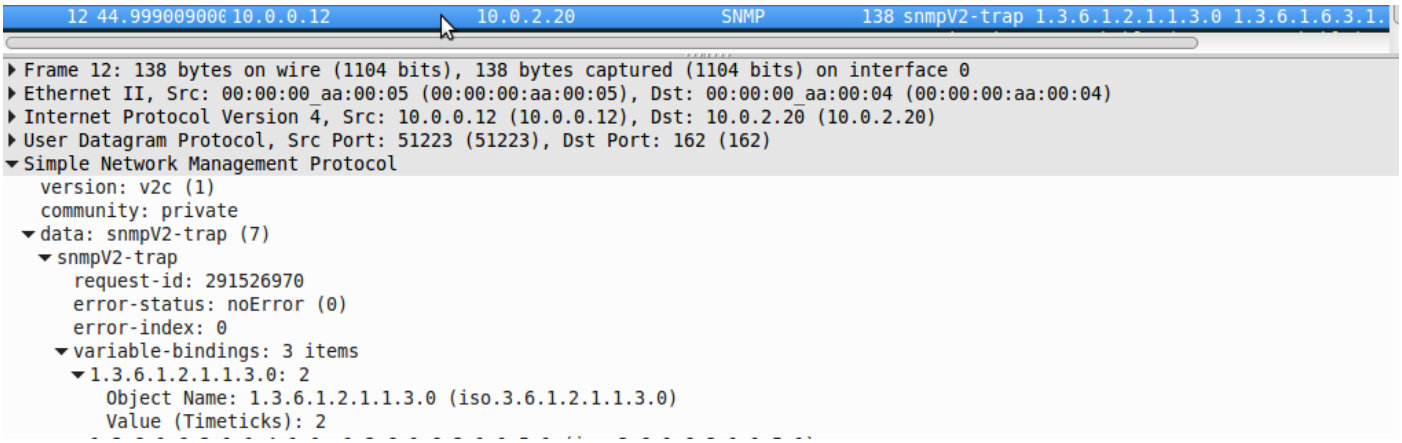
```
service snmpd restart
```



The output on pc1 should look like the following.



The captured packet on Wireshark should look like the following:



Lab sheet 4.1: write the values of the PDU fields of the last SNMPv2 trap received by pc1.

Version	PDU Type	Request ID	Error Status	Error Index	VarBind 1 name	VarBind 1 value