深圳职业技术⼤学 - Python⾼级编程 - 2023

PySNMP实验⼿册

1 PySNMP简介

PySNMP是Python的第三⽅模块，实现了SNMP v1/v2c/v3的所有功能，最新版本为v4.4.12。使⽤者可以使⽤ Python语⾔，利⽤该模块实现SNMP的所有操作。

PIP国内源安装PySNMP并降级安装pyasn1的0.4.8版本：

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| pip install pysnmp pyasn1==0.4.8 -i http://mirrors.aliyun.com/pypi/simple/ --trusted-  host mirrors .aliyun.com |

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| C:\Users\Administrator>pip install pysnmp -i http://mirrors.aliyun.com/pypi/simple/ --  trusted-host mirrors .aliyun.com  Collecting pysnmp  Downloading pysnmp-4.4.12-py2.py3-none-any.whl (296 kB)  |████████████████████████████████| 296 kB 409 kB/s  Collecting pysmi  Downloading pysmi-0.3.4-py2.py3-none-any.whl (80 kB)  |████████████████████████████████| 80 kB 838 kB/s  Collecting pycryptodomex  Downloading pycryptodomex-3 .10 .1-cp35-abi3-win\_amd64.whl (1 .6 MB)  |████████████████████████████████| 1.6 MB 159 kB/s  Collecting pyasn1>=0.2.3  Downloading pyasn1-0.4.8-py2.py3-none-any.whl (77 kB)  |████████████████████████████████| 77 kB 211 kB/s  Collecting ply  Downloading ply-3.11-py2.py3-none-any.whl (49 kB)  |████████████████████████████████| 49 kB 147 kB/s  Installing collected packages: ply, pysmi, pycryptodomex, pyasn1, pysnmp  Successfully installed ply-3 .11 pyasn1-0 .4 .8 pycryptodomex-3 .10 .1 pysmi-0 .3 .4 pysnmp-  4.4.12  WARNING: You are using pip version 20.2.2; however, version 21.0.1 is available .  You should consider upgrading via the 'd:\python3 7 6\python.exe -m pip install --  upgrade pip' command . |

检查 pysnmp的版本

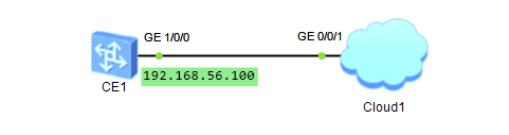
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| C:\Users\Administrator>python  Python 3.7.6 (tags/v3.7.6:43364a7ae0, Dec 19 2019, 00:42:30) [MSC v .1916 64 bit (AMD64)]  on win32  Type "help", "copyright", "credits" or "license" for more information .  >>> import pysnmp  >>> pysnmp . version  '4 .4 .12'  >>> |

2 ⽹络拓扑

某公司现有⼀台CE12800设备，管理IP地址为<192.168.56.100> /24，可以SSH远程登陆。现有SNMP配置脚本snmp.txt ⽂件。需要编写⾃动化脚本，⾸先进⾏设备SNMP配置，然后收集设备SNMP信息。



⽂件snmp.txt的内容

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| snmp-agent usm-user v3 admin group dc-admin  snmp-agen usm v3 admin au sha  Huawei@123  Huawei@123  snmp-a usm-user v3 admin pr aes128  Huawei@123  Huawei@123  snmp-agent trap source G1/0/0  snmp-agent mib-view included nt iso  snmp-agent mib-view included rd iso  snmp-agent mib-view included wt iso  snmp-agent mib-view included iso-view iso  snmp-agent group v3 dc-admin privacy read-view rd write-view wt notify-view nt |

3 配置CE1的SSH服务并添加⽤户

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| <HUAWEI>system-view immediately  Enter system view, return user view with return command .  [HUAWEI]sysname CE1  [CE1]interface Vlanif 1 |

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| [CE1-Vlanif1]ip add <192.168.56.100> 24  [CE1-Vlanif1]quit  [CE1]  [CE1]interface GE1/0/0  [CE1-GE1/0/0]undo shutdown  [CE1-GE1/0/0]quit  [CE1]  [CE1]stelnet server enable  [CE1]user-interface vty 0 4  [CE1-ui-vty0-4]authentication-mode aaa  [CE1-ui-vty0-4]protocol inbound ssh  [CE1-ui-vty0-4]user privilege level 3 [CE1-ui-vty0-4]quit  [CE1]  [CE1]aaa  [CE1-aaa]local-user python password irreversible-cipher Huawei12#$  [CE1-aaa]local-user python user-group manage-ug  [CE1-aaa]local-user python service-type ssh  [CE1-aaa]quit  [CE1]  [CE1]ssh user python  [CE1]ssh user python authentication-type password  [CE1]ssh user python service-type stelnet |

4 PySNMP代码

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| # 1、导入模块  import paramiko  import time  from pysnmp .hlapi import \*  # 2、定义交换机信息  ip = '192 .168 .56 .100'  username= 'python'  password= 'Huawei12#$'  # 3 、SSH登陆设备  ssh = paramiko.client .SSHClient ()  ssh .set\_missing\_host\_key\_policy(paramiko.client .AutoAddPolicy())  ssh .connect (hostname= ip ,port=22 ,username=username ,password=password)  print(ip+ ' login succesfully' )  # 4、打开一个channel，输入配置  cli = ssh . invoke\_shell ()  cli .send ( 'N\n' )  time .sleep(0.5 )  cli .send ( 'screen-length 0 temporary\n' ) |

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| time .sleep(0.5 )  # 5、进入系统视图  cli .send ( 'system-view immediately\n' )  time .sleep(0.5 )  # 6、逐行读取本地同一个文件夹里的snmp.txt，写入SSH通道  f = open ( 'snmp.txt' , 'r' )  snmp\_config\_list = f . readlines ()  for i in snmp\_config\_list :  cli .send ( i )  time .sleep(0.5 )  # 7、建立SNMP的通道  UdpTransportTarget((ip ,161 ))  # 8、通过pySNP获取设备的主机名  g = getCmd(  SnmpEngine(),  UsmUserData (  'admin' ,  'Huawei@123' ,  'Huawei@123' ,  authProtocol=usmHMACSHAAuthProtocol ,  privProtocol=usmAesCfb128Protocol  ),  UdpTransportTarget((ip , 161 )),  ContextData (),  ObjectType(ObjectIdentity( 'SNMPv2-MIB' , 'sysName' , 0 ))  )  errorIndication , errorStatus , errorIndex , varBinds = next (g )  for i in varBinds :  print(i )  print(str ( i ) .split( '=' )[1 ] .strip())  # 9、最大限度接收返回信息  dis\_this = cli . recv (999999 ) .decode ()  print(dis\_this )  #关闭会话  ssh .close () |

执⾏以上代码，可以得到如下输出

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| <192.168.56.100> login succesfully  SNMPv2-MIB::sysName.0 = CE1  CE1  Warning: The initial password poses security risks .  The password needs to be changed. Change now? [Y/N]:N |

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| Info: The max number of VTY users is 5, the number of current VTY users online is 1, and  total number of terminal users online is 2.  The current login time is 2021-08-14 15:28:55 .  First login successfully.  <CE1>screen-length 0 temporary  Info: The configuration takes effect on the current user terminal interface only.  <CE1>system-view immediately  Enter system view, return user view with return command .  [CE1]snmp-agent usm-user v3 admin group dc-admin  Warning: Adding the user to a privacy group is recommended, because the bound group has  insecure properties (with authentication or noauthentication configured) .  [CE1]snmp-agen usm v3 admin au sha  Please configure the authentication password (8-255)  Enter Password:  Confirm Password:  [CE1]snmp-a usm-user v3 admin pr aes128  Please configure the privacy password (8-255) Enter Password:  Confirm Password:  Warning: The privacy and authentication passwords are the same, which is insecure . It is  recommended that the privacy and authentication passwords be different .  [CE1]snmp-agent trap source G1/0/0  Warning: Please configure an IP address to the interface .  [CE1]snmp-agent mib-view included nt iso  [CE1]snmp-agent mib-view included rd iso  [CE1]snmp-agent mib-view included wt iso  [CE1]snmp-agent mib-view included iso-view iso  [CE1]snmp-agent group v3 dc-admin privacy read-view rd write-view wt notify-view nt  [CE1] |

思考：如何通过Netmiko实现以上代码？

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