가상 네트워크(SDN/NFV) 보안과 안전한 인프라 구축을 위한 교육 (v2.0)

엔터프라이즈 시스템/네트워크 운영자 대상

(for IT Pros and System Administrators)

KOREN e2e 서비스 활용을 위한 실습 구성

2018년 11월

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8. **ntopng** (플로우 모니터)
9. **vIDS** (Security Onion)

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8. ntopng (플로우 모니터)
9. vIDS (Security Onion)

1. 실습 환경 준비

❖ 사용 가능 소프트웨어

① Linux OS (Bare metal 설치 Lab 환경 구성 고려)

- Fedora 또는 CentOS
- Ubuntu 또는 Debian
- Open Network Linux (https://opennetlinux.org/)
- 기타

② Hardware 고려

- Intel 기반
- ARM 기반

③ 하이퍼바이저 기반 가상 네트워크 소프트웨어

- 가상화 보안 어플라이언스 (방화벽, IDS, SIEM등)
- 가상화 네트워크 어플라이언스 (라우터, SDN 제어기등)

OS	Packaging Tools	기타
Ubuntu	debian packaging (*.deb → apt-get install)	Debian
Fedora	redhat packaging (.rpm → yum(dnf) install	RHEL, CentOS
Open Network Linux	nos-install-image (onie install)	Accton(7), Agema(1), Alpha Network(2), Dell(2), Penguin(3), Quanta(3)

메모:

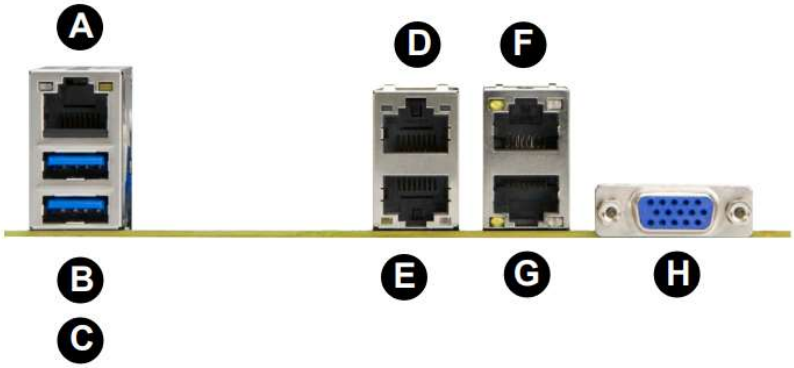
- Current ONIE Hardware Status:
  http://www.opencompute.org/wiki/Networking/ONIE/HW_Status

1. 실습 환경 준비

❖ 하드웨어

① **CPU w/Passive CPU heat sink**
- Intel® Xeon® processor D-1528
- FCBGA 1667
- CPU TDP support 35W, 9MB, 6 Cores, 12 Threads, 1.9-2.2GHz

② **RAM**
③ **SSD**
④ **IPMI 2.0**
⑤ **10GbE 2포트, 1 GbE LAN 2포트, IPMI 2.0 전용 LAN**
⑥ **SR-IOV** (Single-Root Virtualization)



Back Panel I/O			
A	IPMI LAN	E	LAN Port 1 (-F, -LN2F, -TLN4F)
B	USB Port 1	F	LAN Port 4 (-TLN2F and -TLN4F)
C	USB Port 0	G	LAN Port 3 (-TLN2F and -TLN4F)
D	LAN Port 2 (-F, -LN2F, -TLN4F)	H	VGA Port

메모:
- Low noise fan speed control

1. 실습 환경 준비

❖ 하이퍼바이저 설치 @ KOREN AI Network Lab

① **Initial Powering Up (w/o Internet)**

② **USB booting Available**

③ **Alt-Ctrl-D로 Rebooting 하여 install 가능**

④ **Rebooting 시 'F11'에서 USB Booting 선택 (SanDisk)**

⑤ **ESXi '6.0' vs '6.5'** (실습 진행 편리를 위한 선택)

⑥ **Windows Server 2016 Hyper-v 고려**

⑦ **개인용 노트북 사용** (PDF viewer, Putty, WEB browser, Software Tools)

메모:

- ESXi 다운로드 주소: https://my.vmware.com/en/web/vmware/evalcenter?p=free-esxi6
- 디스크 이미지 굽기: Rufus 도구 사용 https://rufus.akeo.ie/
- Disk Imager https://sourceforge.net/projects/win32diskimager/files/latest/download
- USB 부팅 제가동은 전원 off/on (전원 케이블 포함)필요함

1. 실습 환경 준비

❖ 실습 구성 @ KOREN AI Network Lab

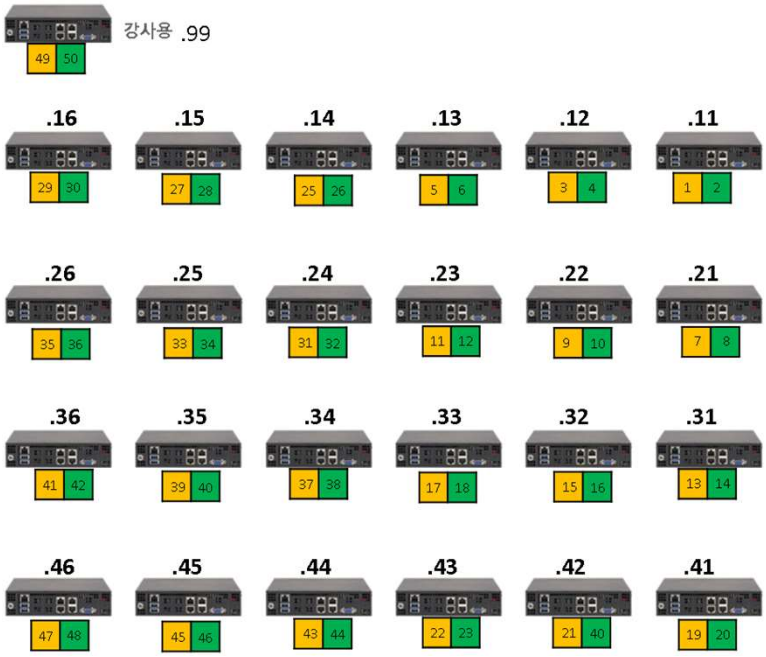
① USB 메모리

- OS
- 소프트웨어 도구 (Software Tools)

② IPMI 연결 이더넷 케이블

③ 인터넷 연결 케이블

④ 좌석 번호 별 서브넷의 해당 IP주소(x.x.x.nn) 설정 사용



메모:

- 하이퍼바이저 설치 환경은 구조 분석을 고려하여 도구를 접속하여 미러링 가능한 네트워크 구성이 가능해야 함.
- 가상스위치는 분석을 위한 무작위(Promiscuous) 모드 설정 고려
- IPMI: Intelligent Platform Management Interface

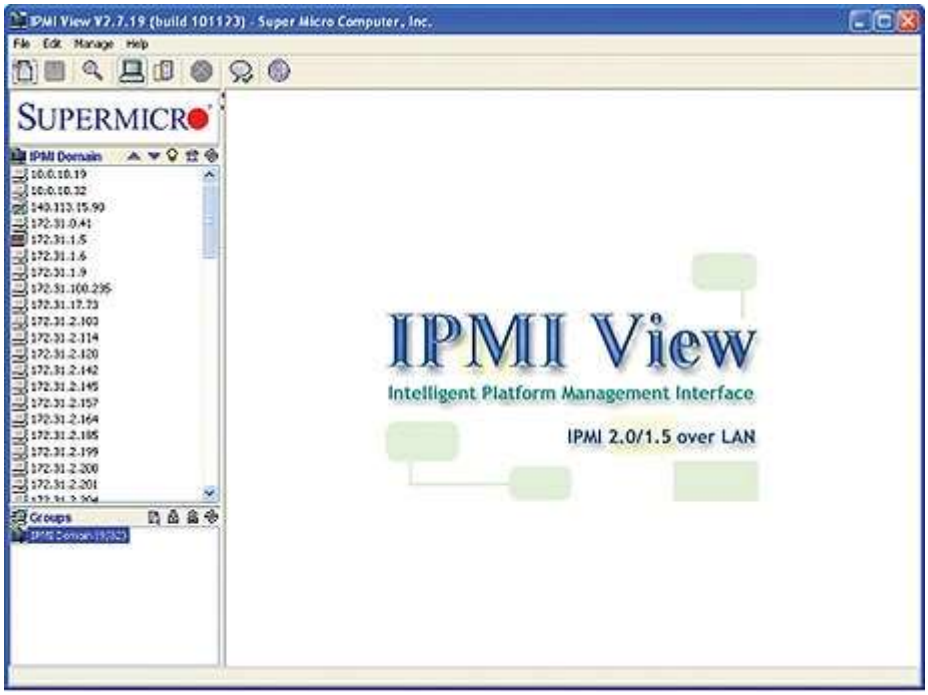
1. 실습 환경 준비

❖ IPMI

① 개요

- Supermicro Intelligent Management
- The Supermicro X11 platform's Baseboard Management Controller (BMC) is built on the ASPEED AST 2500 controller.

② 시연



메모:

- 슈퍼마이크로 보드 기준 IPMI는 기본적인 IPMI 통신 포트인 623
- 웹으로 구현된 관리 인터페이스인 80(HTTP), 443(HTTPS)로 사용
- 원격 조종에는 5900(KVM) 포트도 사용
- 최초 접속시 Username/Password는 ADMIN/ADMIN 입니다.

1. 실습 환경 준비

❖ 하이퍼바이저 비교

① **Microsoft의 Hyper-v는 평가기간 무제한**
② **vSphere 6.5 평가판은 60일간 모든 기능 제공하며, 평가 기간 종료 후에 상용기능 정지**
③ **하이퍼바이저 사용 실습에서는 LAN/웹브라우저/PDF뷰어 지원 개인 노트북 지참**
④ **실습은 ESXi 6.7 사용** (전용 클라이언트 없이 웹으로 접속)

제품 / 기능	Microsoft	VMware vSphere 6.5		
	Hyper-V 2016	Free Hypervisor	Essential Plus	Enterprise Plus
VM 호스트 라이브 마이그레이션	Yes	No	Yes	Yes
VM 스토리지 라이브 마이그레이션	Yes	No	No	Yes
스토리지/네트워크 QoS	Yes	No (just disk shares)	No (just disk shares at host level)	Yes
하드웨어 패스드루	Discrete Device Assignment	PCI VM Direct Path USB redirection	PCI VM Direct Path USB redirection	PCI VM Direct Path USB redirection
운영 중 추가	Disks/vNIC/RAM	Disks/vNIC/USB	Disks/vNIC/USB	Disks/vNIC/USB/ CPU/RAM
운영 중 제거	Disks/vNIC/RAM	Disks/vNIC/USB	Disks/vNIC/USB	Disks/vNIC/USB/CP U
디스크 사이즈 조정	Hot-grow and shrink	Hot-grow	Hot-grow	Hot-grow
VM 암호화	Yes	No	No?	Yes

메모:

- 여러 명이 개요 수준 실습을 진행하며 웹브라우저가 동일하지 않은 경우 vSPhere 6.0과 전용 클라이언트 소프트웨어 사용 권장
- Type 2 Hypervisor는 VMware (WorkStation) Player 또는 VirtualBox 사용 가능 노트북 미지참 실습은 베어메탈 서버에 리눅스 설치 (USB 허브 필요)

1. 실습 환경 준비

❖ Hypervisor Installation

① **Initial Powering Up (w/o Internet)**

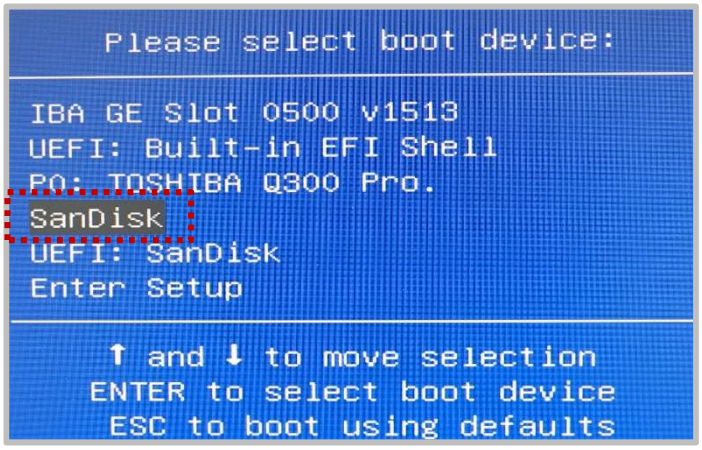
② **USB booting Available**

③ **Alt-Ctrl-D로 Rebooting 하여 install 가능**

④ **Rebooting 시 'F11'에서 USB Booting 선택**

⑤ **ESXi '6.0' vs '6.5' vs '6.7'** (6.7 설치 시연)

⑥ **Windows Server 2016 Hyper-v**



**** 실습 교육 진행은 OS나 웹브라우저 종류별로 다를 수 있는 동작을 고려한 안정적 버전과 도구를 선택하여 진행 ****

메모:

- Windows Containers on Windows Server: https://docs.microsoft.com/en-us/virtualization/windowscontainers/quick-start/quick-start-windows-server
- USB 부팅 재가동은 전원 off/on (전원 케이블 포함)필요함

1. 실습 환경 준비

❖ Hypervisor Installation (ESXi 6.0 예)

메모:

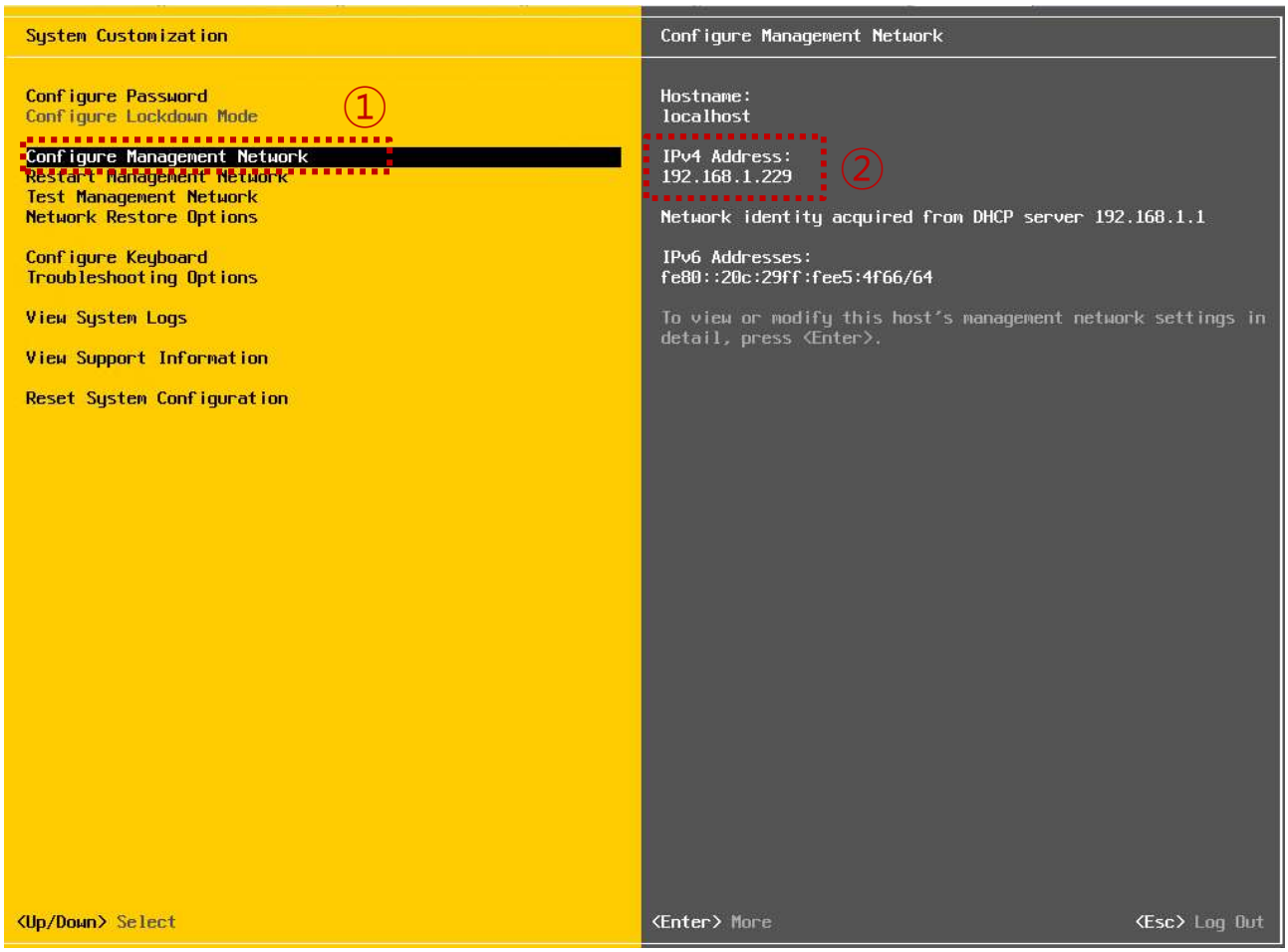
- ESXi 다운로드 주소: https://my.vmware.com/en/web/vmware/evalcenter?p=free-esxi6
- 디스크 이미지 굽기: Rufus 도구 사용 https://rufus.akeo.ie/
- Disk Imager https://sourceforge.net/projects/win32diskimager/files/latest/download
- ESXi 6.7: F11 → Enter → US Default → Root Password (jslab123!@#) → F11

1. 실습 환경 준비

❖ Hypervisor Installation

① **Configure Management Network 선택**

② **좌석 번호 'ㅜㅜ' 이용 고정 IP 주소 설정 - 192.168.1.ㅜㅜ**



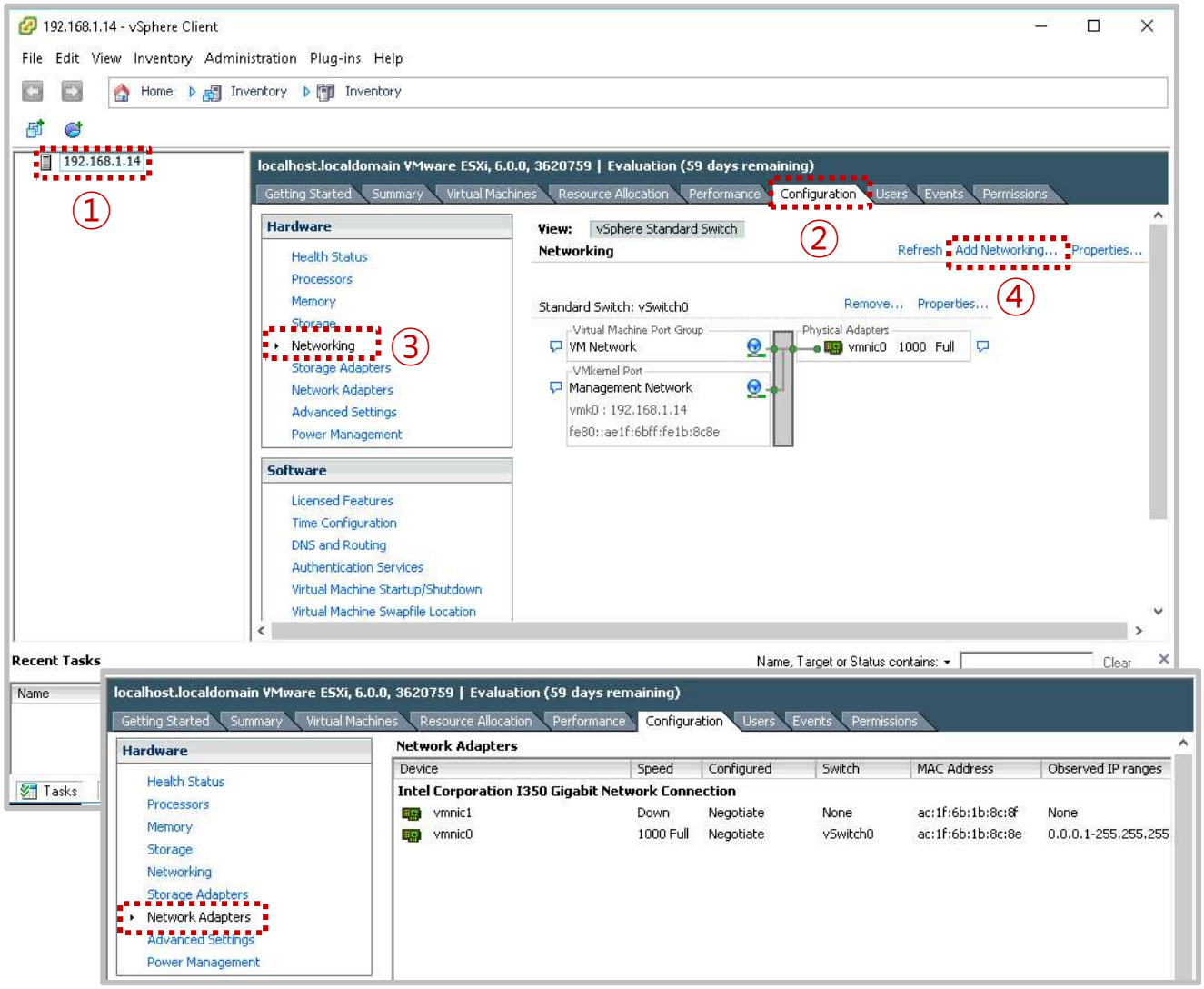
메모:

1. 실습 환경 준비

❖ Hypervisor Installation

① **Networking 선택 확인**

② **Network Adaptor 선택 확인**



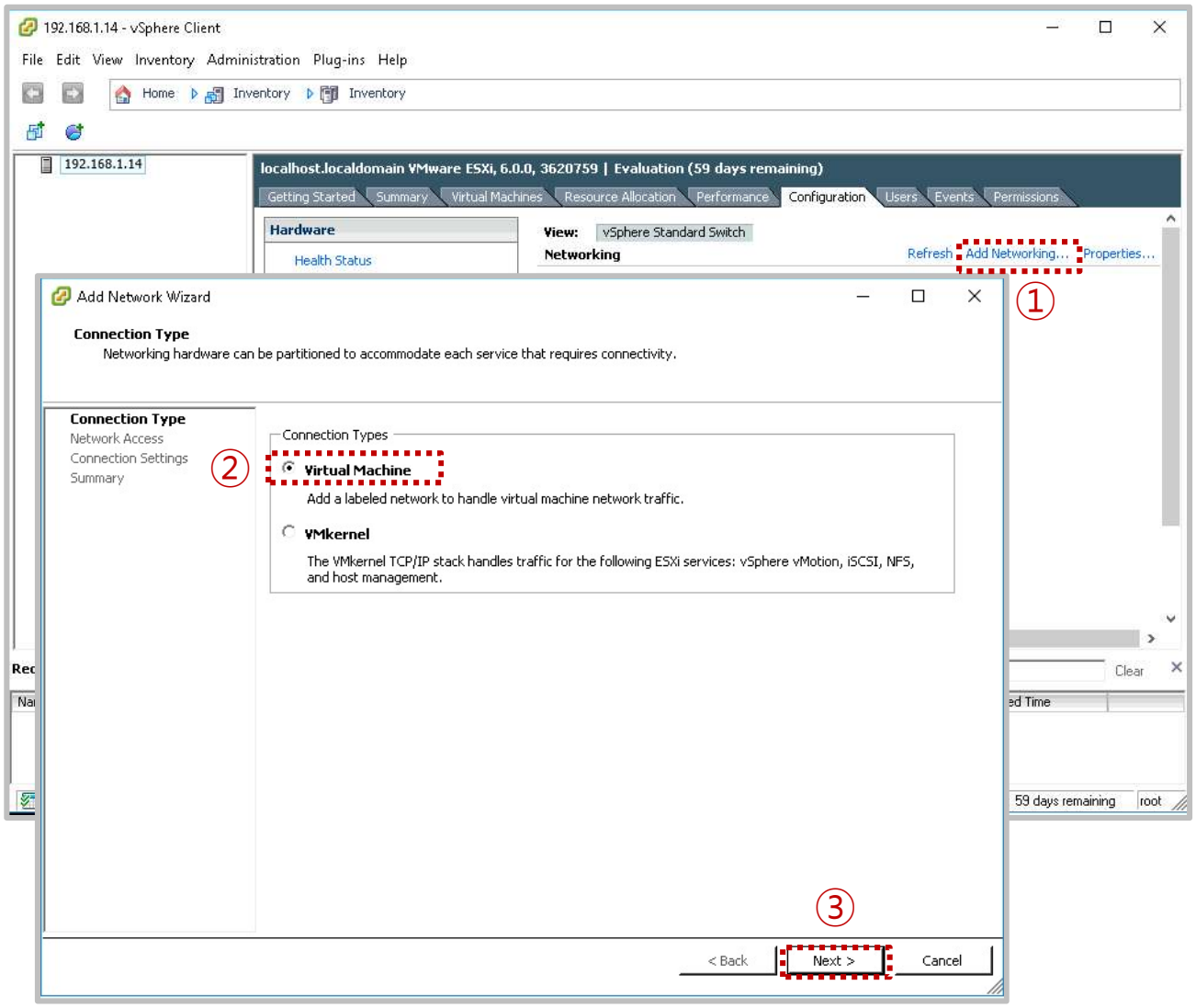
메모:

1. 실습 환경 준비

❖ Hypervisor Installation

① **Add Networking 선택**

② **Virtual Machine 선택**



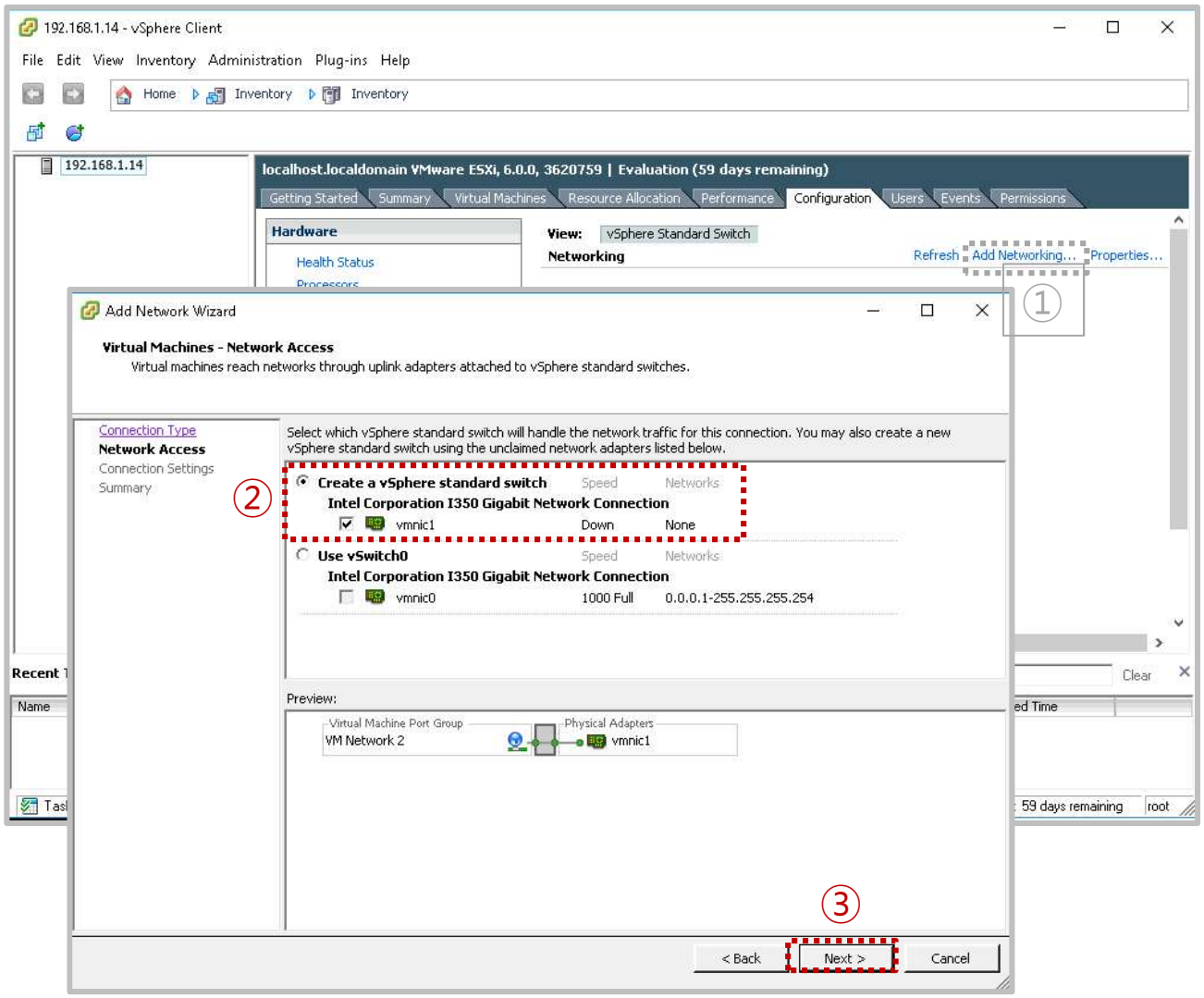
메모:

1. 실습 환경 준비

❖ Hypervisor Installation

① **표준 스위치 생성 선택**

② **유선랜 네트워크 연결** (내부 네트워크를 위한 선택)



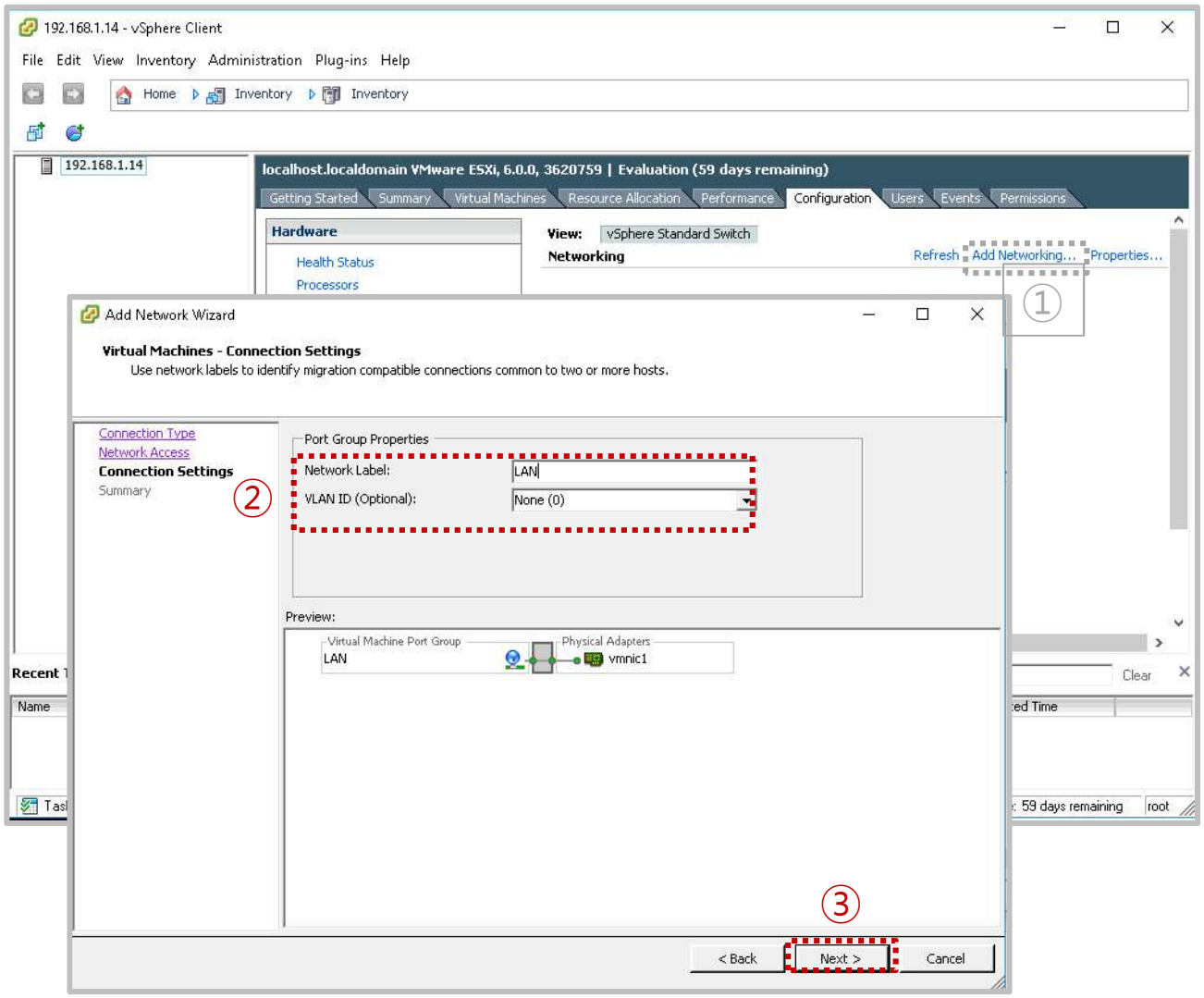
메모:

1. 실습 환경 준비

❖ Hypervisor Installation

① **포트그룹 이름 설정**

② **유선랜 네트워크 연결** (내부 네트워크를 위한 선택)



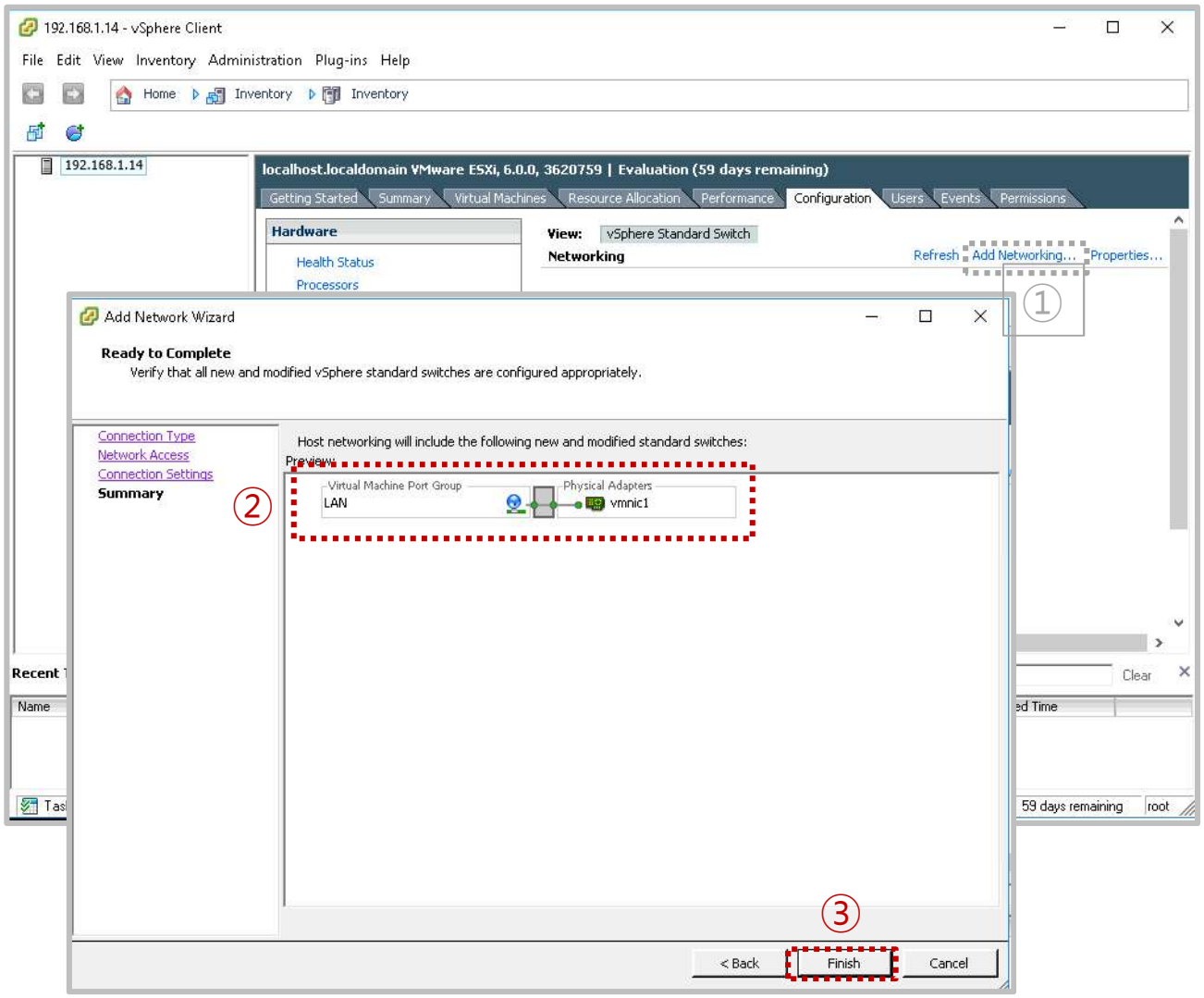
메모:

1. 실습 환경 준비

❖ Hypervisor Installation

① **포트그룹 이름 설정**

② **유선랜 네트워크 연결** (내부 네트워크를 위한 선택)

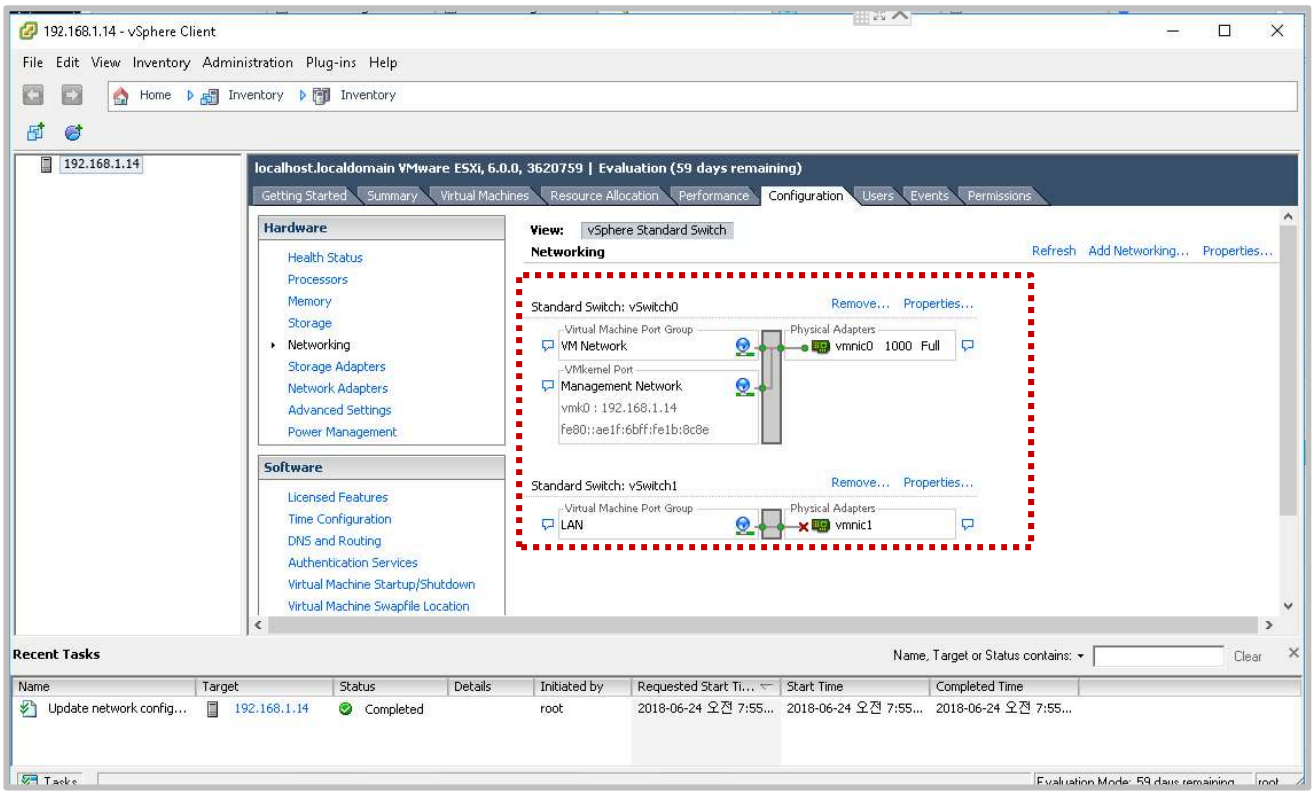


메모:

1. 실습 환경 준비

❖ Hypervisor Installation

① **포트그룹 이름 설정**
② **유선랜 네트워크 연결** (내부 네트워크를 위한 선택)

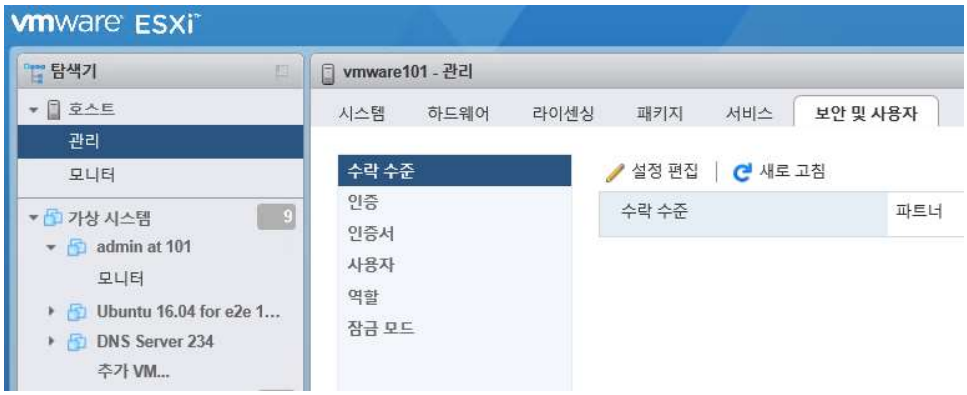


메모:

1. 실습 환경 준비

❖ Hypervisor 보안

① 관리 → 보안 및 사용자
② 서비스



메모:

목차

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2. **vUTM 설치** (pfSense..)
3. **Host 설치** (Linux..)
4. **vLAN 구성** (e2e..)
5. **vFW** (pfSense..)
6. **vIPS** (snort)
7. **웹필터** (SquidGuard)
8. **ntopng** (플로우 모니터)
9. **vIDS** (Security Onion)

2. vUTM 설치

❖ vUTM 개요

- **최고의 보안 인프라 실습 환경 제공**
- **UTM은 기본적인 보안 시스템 내장**
  - ✓ 방화벽
  - ✓ 침입탐지/차단 (IDS/IPS)
  - ✓ L2/L3 라우팅
  - ✓ 무선랜 보안
  - ✓ 가상사설망(VPN)
  - ✓ 웹필터링 (Web Filtering)
  - ✓ 안티바이러스
  - ✓ DLP (Data Loss Prevention)
- **실습은 오픈소스 사용** (pfSense 소호 레퍼런스)
  - ✓ 라우터 모드, 브릿지 모드 제공
  - ✓ Stateful packet filtering
  - ✓ OS/Network 핑거프린팅 필터링
  - ✓ 방화벽 로그
  - ✓ 이중화 (고가용성)
  - ✓ 룰 그룹 관리 (Aliases)DDoS 방어 (SynProxy)
  - ✓ VPN (IPSEC/OpenVPN/PPTP/SSH 터널링 연동)
  - ✓ 웹필터링/웹프락시 (SquidGuard)
  - ✓ AntiVirus (ClamAV)
  - ✓ 모니터링 (CPU, Throughput, 그래프, 포털)

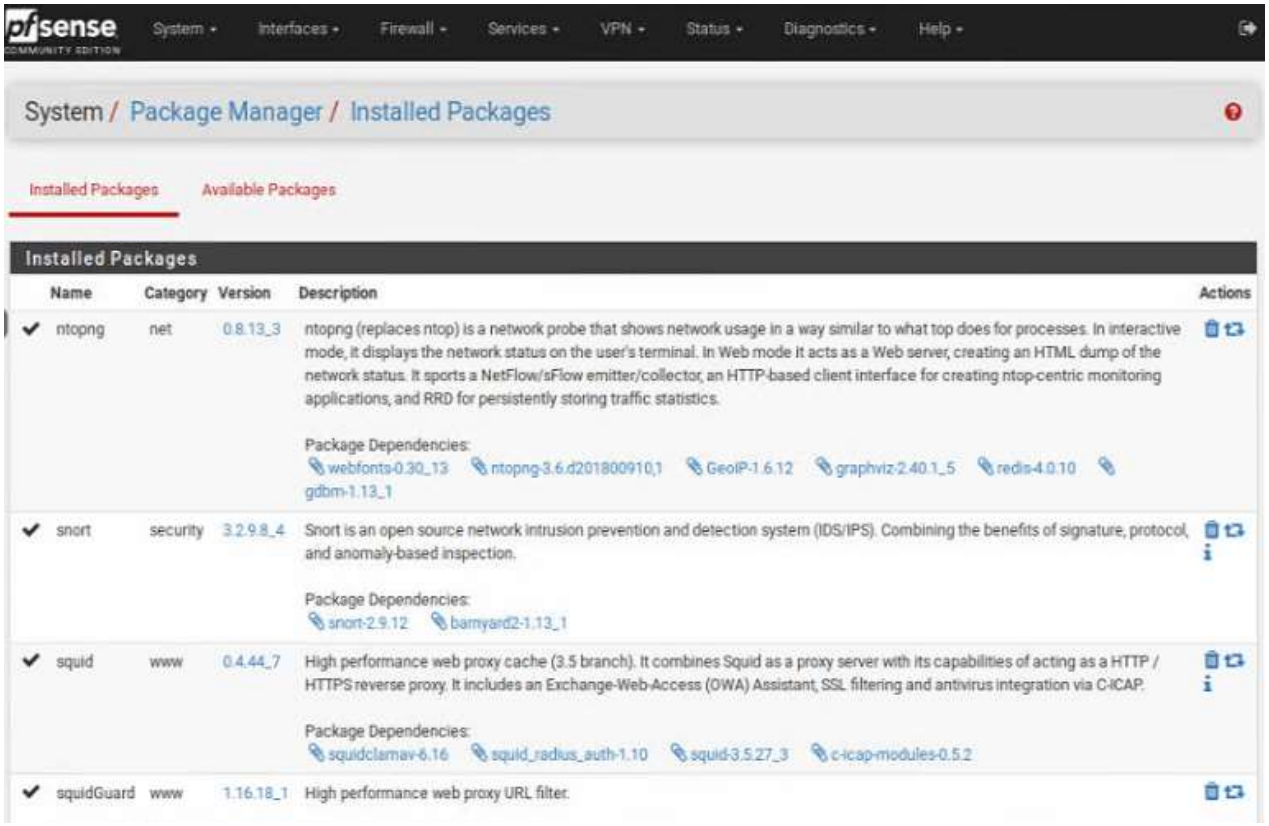
메모:

- pfSense 이미지 다운로드: https://www.pfsense.org/download/
- ISO 이미지 사용 (AMD64 64비트용)

2. vUTM 설치

❖ vUTM 개요

- **실습 설치 (pfSense)**
  - ✓ ntopng (플로우 모니터)
  - ✓ Snort (IDS/IPS)
  - ✓ Squid (프락시/웹필터)
  - ✓ SquidGuard (웹필터)

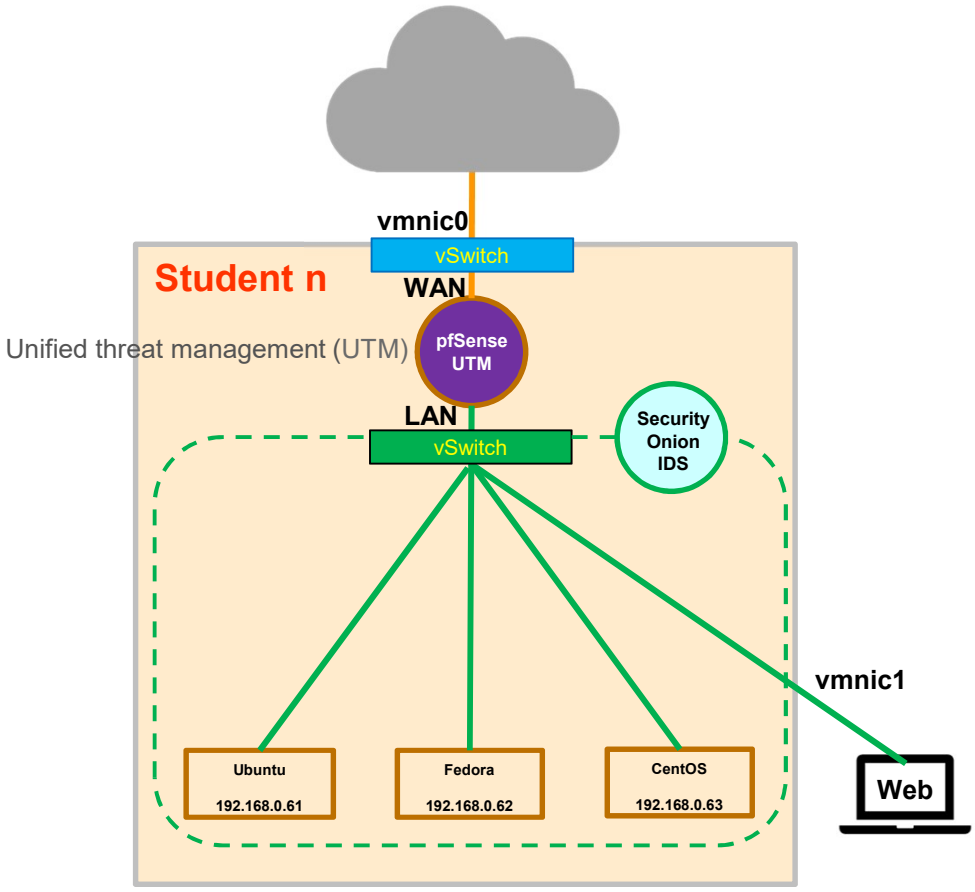


메모:

2. vUTM 설치

❖ vUTM 'pfSense' 설치 환경

① **하이퍼바이저 내 인터넷용과 호스트 연결 스위치 2개 필요**
② **WAN은 인터넷, LAN은 호스트 연결 vSwitch 별도 생성**
③ **센서 접속 부분의 스위치는 미러 기능 제공 세팅 필요**
④ **설정을 위한 클라이언트는 VM 또는 유선랜 연결 PC 사용** (외부 유선랜 연결이 어려운 경우 하이퍼바이저에 웹으로 연결 사용)



메모:

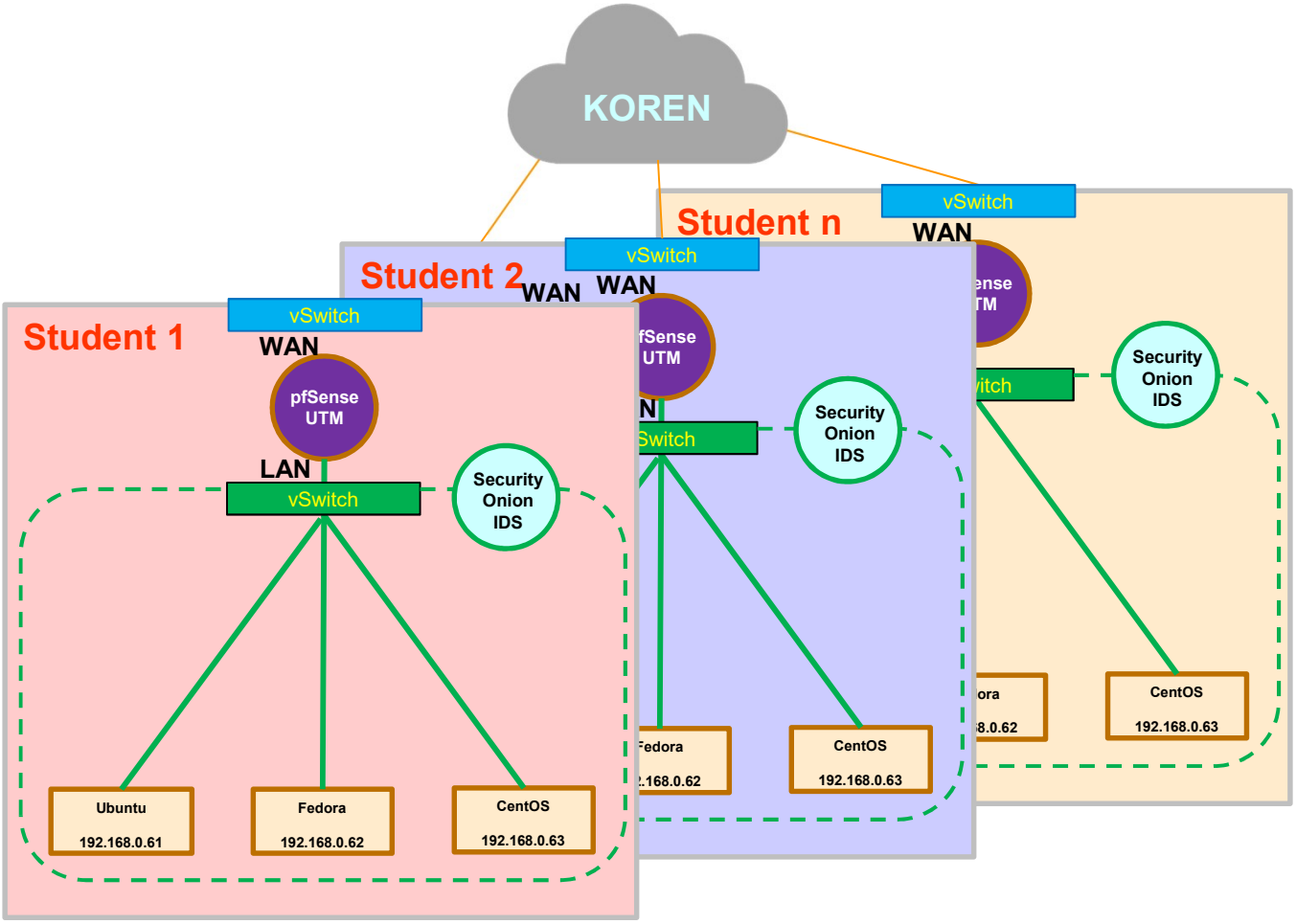
- pfSense는 IDS/IPS, 방화벽, LB, 웹방화벽, NAT, DHCP 서버 등의 기능 제공

2. vUTM 설치

❖ vUTM ‘pfSense’ 설치 환경

① **WAN은 개인별 고정 IP주소 설정 권장**

② **LAN은 임의의 IP주소 설정 가능 (클라이언트를 위한 DHCP 서버 사용과 보안 기기를 위한 고정 IP 주소 사용)**



메모:

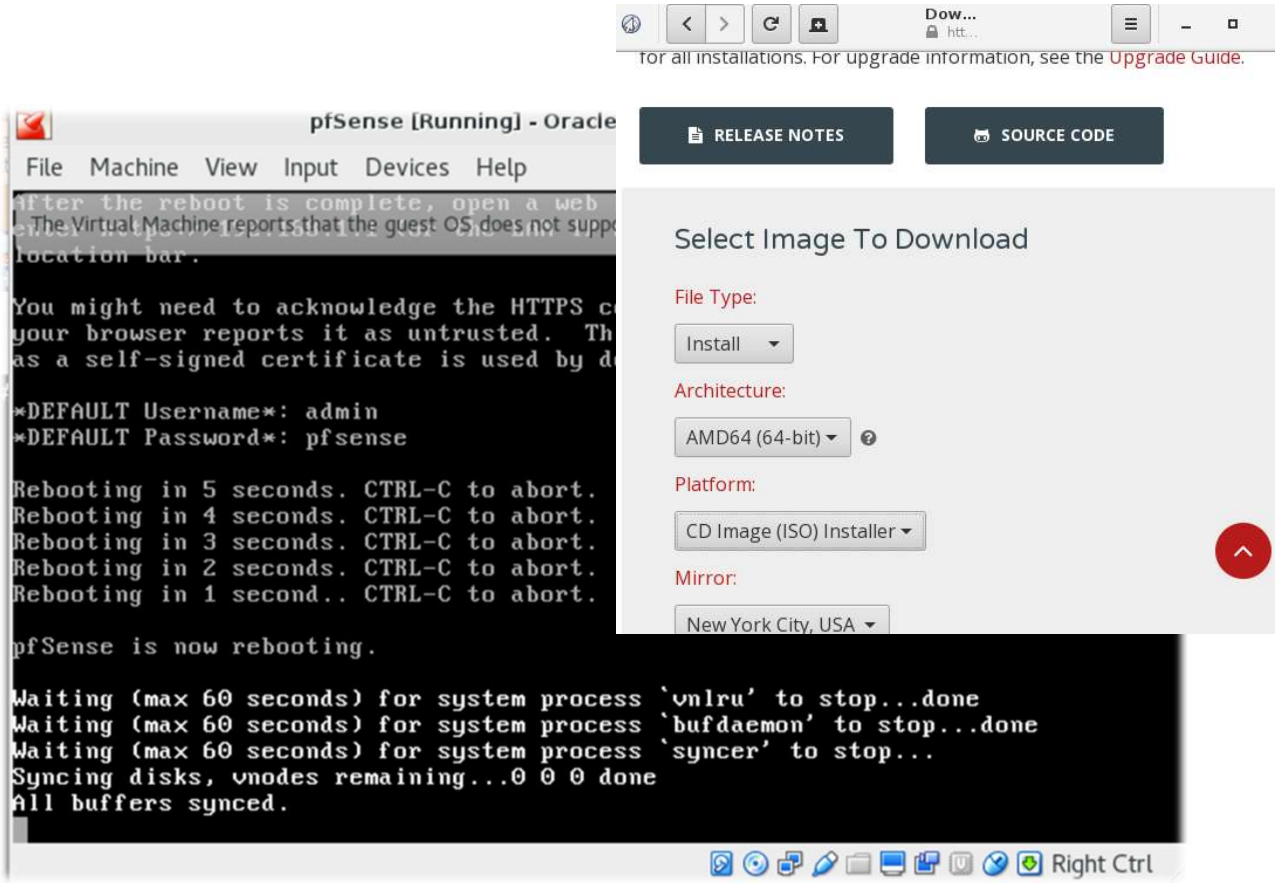
- Host는 Ubuntu Desktop과 Fedora Workstation ISO 이미지 제공
- vUTM과 vIDS용 ISO 이미지 사용 설치

2. vUTM 설치

❖ pfSense 설치 준비

- **pfSense 설치 (Type 1 또는 Type 2 하이퍼바이저 사용 가능)**

① **다운로드: pfsense site** (https://www.pfsense.org/)
② **2개 이상 인터페이스 지정** (WAN/LAN)
③ **ISO 이미지 다운로드** (또는 USB Memory)
④ **pfSense 설치** (VirtualBox or 베어메탈 서버 or Type 1 하이퍼바이저)



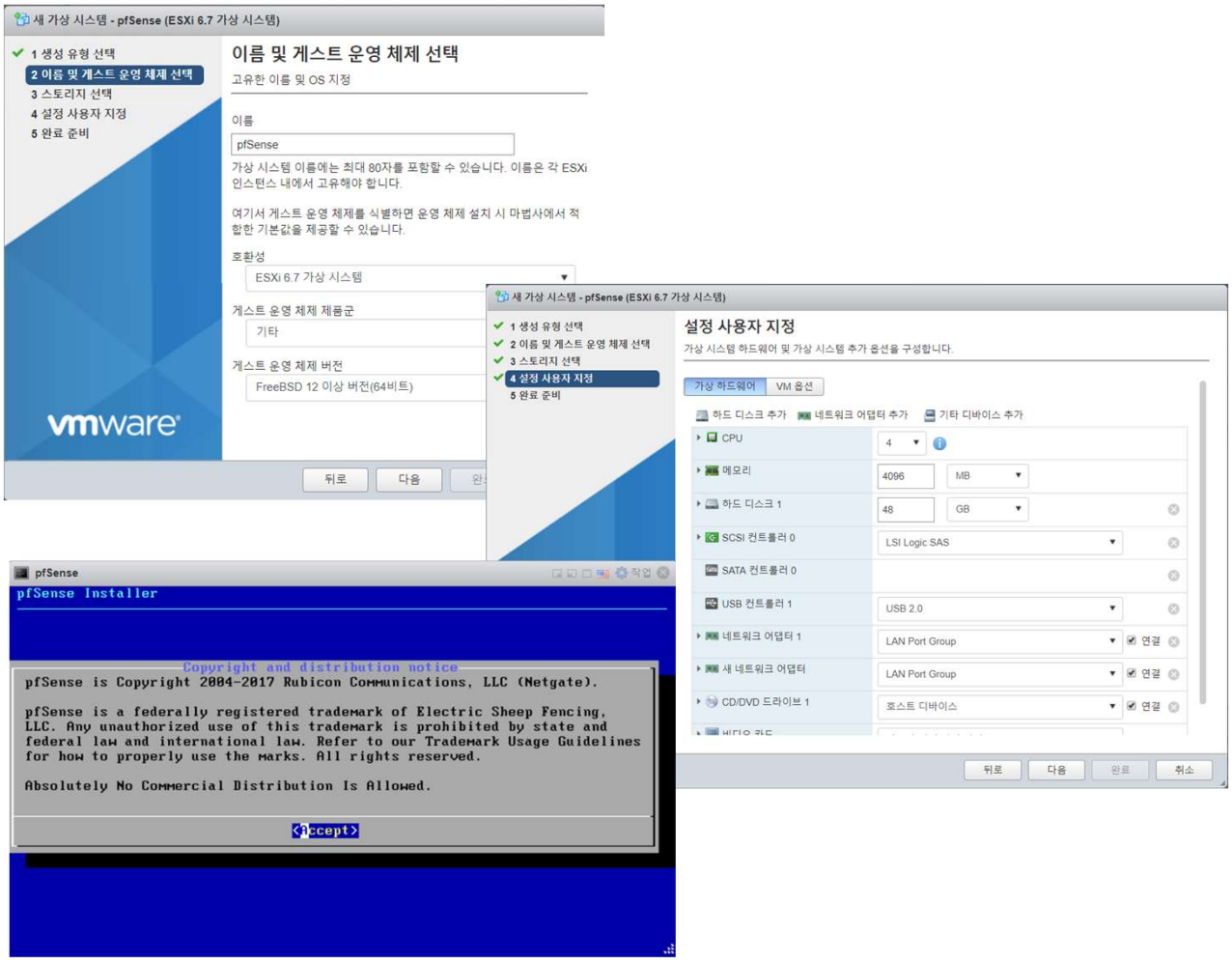
메모:

- pfSense 다운로드 주소: https://www.pfsense.org/
- ESXi 설치시 가상 스위치를 L2 Looping 을 방지하는 구성으로 해야함
- ESXi 설치시 동일 네트워크에 여러 사용자가 동시 접속 시 VyOS의 라우팅 사용 권장

2. vUTM 설치

❖ vUTM ‘pfSense’ 설치

① 이름과 운영체제 선택
② 자원 설정 (vCPU/vRAM/vHDD)
③ 설치



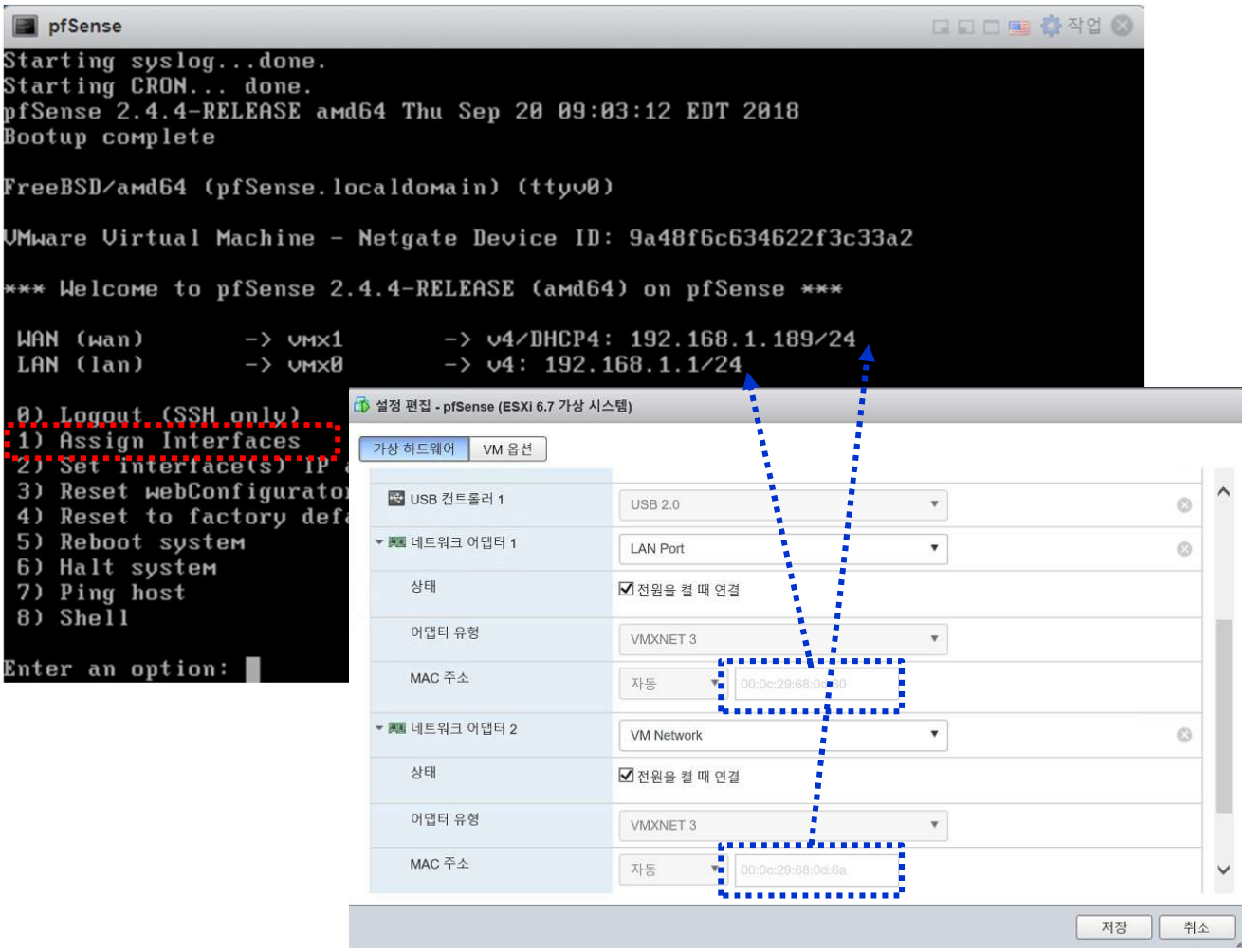
메모:

- pfSense 이미지 다운로드: https://www.pfsense.org/download/
- pfSense는 IDS/IPS, 방화벽, LB, 웹방화벽, NAT, DHCP 서버 등의 기능 제공
- ISO 이미지 사용 (AMD64 64비트용)

2. vUTM 설치

❖ vUTM ‘pfSense’ 연결 설정

- **1) Assign Interfaces (LAN / WAN 설정)**
- **LAN / WAN MAC 주소 확인 @ 하이퍼바이저**



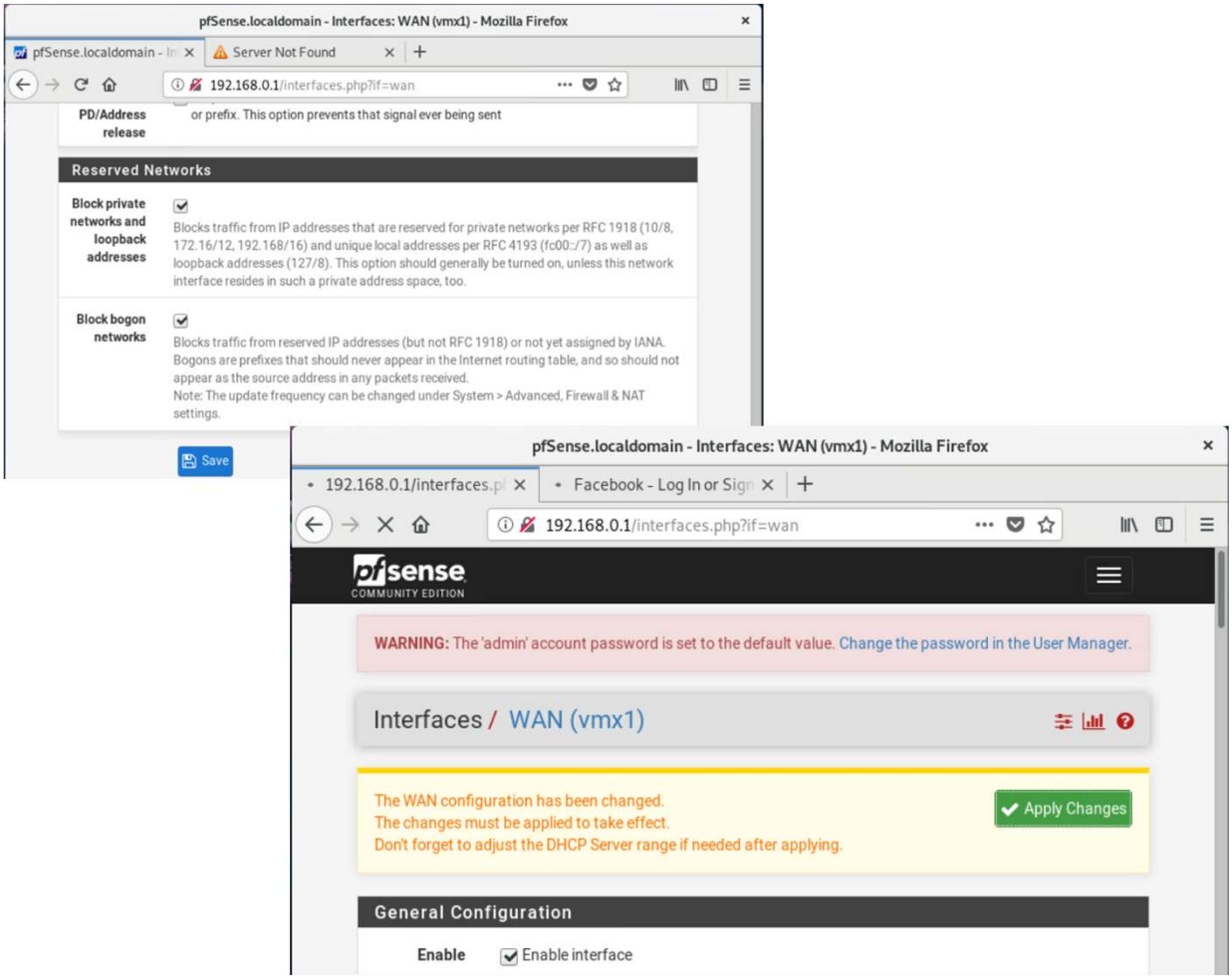
메모:

- pfSense 이미지 다운로드: https://www.pfsense.org/download/
- pfSense는 IDS/IPS, 방화벽, LB, 웹방화벽, NAT, DHCP 서버 등의 기능 제공
- ISO 이미지 사용 (AMD64 64비트용)

2. vUTM 설치

❖ vUTM ‘pfSense’ 설정 환경

- **사설 IP지원 설정 확인 (uncheck Block)**
- **Click Button “Apply Changes”**



메모:

- RFC1918: 인터넷 어드레싱 아키텍처에서 사설 IP 주소 공간을 이용하는 표준

RFC1918 이름	IP 주소 범위	주소 개수	클래스 내용	최대 사이더 블록 (서브넷 마스크)	호스트 ID 크기
24비트 블록	10.0.0.0 – 10.255.255.255	16,777,216	클래스 A 하나	10.0.0.0/8 (255.0.0.0)	24 비트
20비트 블록	172.16.0.0 – 172.31.255.255	1,048,576	16개의 인접 클래스 B	172.16.0.0/12 (255.240.0.0)	20 비트
16비트 블록	192.168.0.0 – 192.168.255.255	65,536	256개의 인접 클래스 C	192.168.0.0/16 (255.255.0.0)	16 비트

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5. **vFW** (pfSense..)
6. **vIPS** (snort)
7. **웹필터** (SquidGuard)
8. **ntopng** (플로우 모니터)
9. **vIDS** (Security Onion)

3. Host 설치 (Linux)

❖ Host 설치 환경

① **ISO 파일 선택** # Type 1 하이퍼바이저 설치시

- Ubuntu Desktop 18.04
- Fedora Workstation 29
- Ubuntu Server 16.04 (Hyperledger, OpenStack 설치 시)

② **ISO 파일 Upload**

③ **Ubuntu Desktop과 Fedora Workstation 29는 시연으로 진행**

④ **Ubuntu Server 는 설정 순서 제공**

메모:

- Type 2 하이퍼바이저에서 VM 설치방법 1: 우분투(Ubuntu Server/Desktop) OVA 제공
- Type 2 하이퍼바이저에서 VM 설치방법 2: 우분투(Ubuntu Server/Desktop) ISO 제공 설치
- VMware Standalone Converter 사용하여 배포
- 루트계정 활성화: sudo passwd root

3. Host 설치 (Linux)

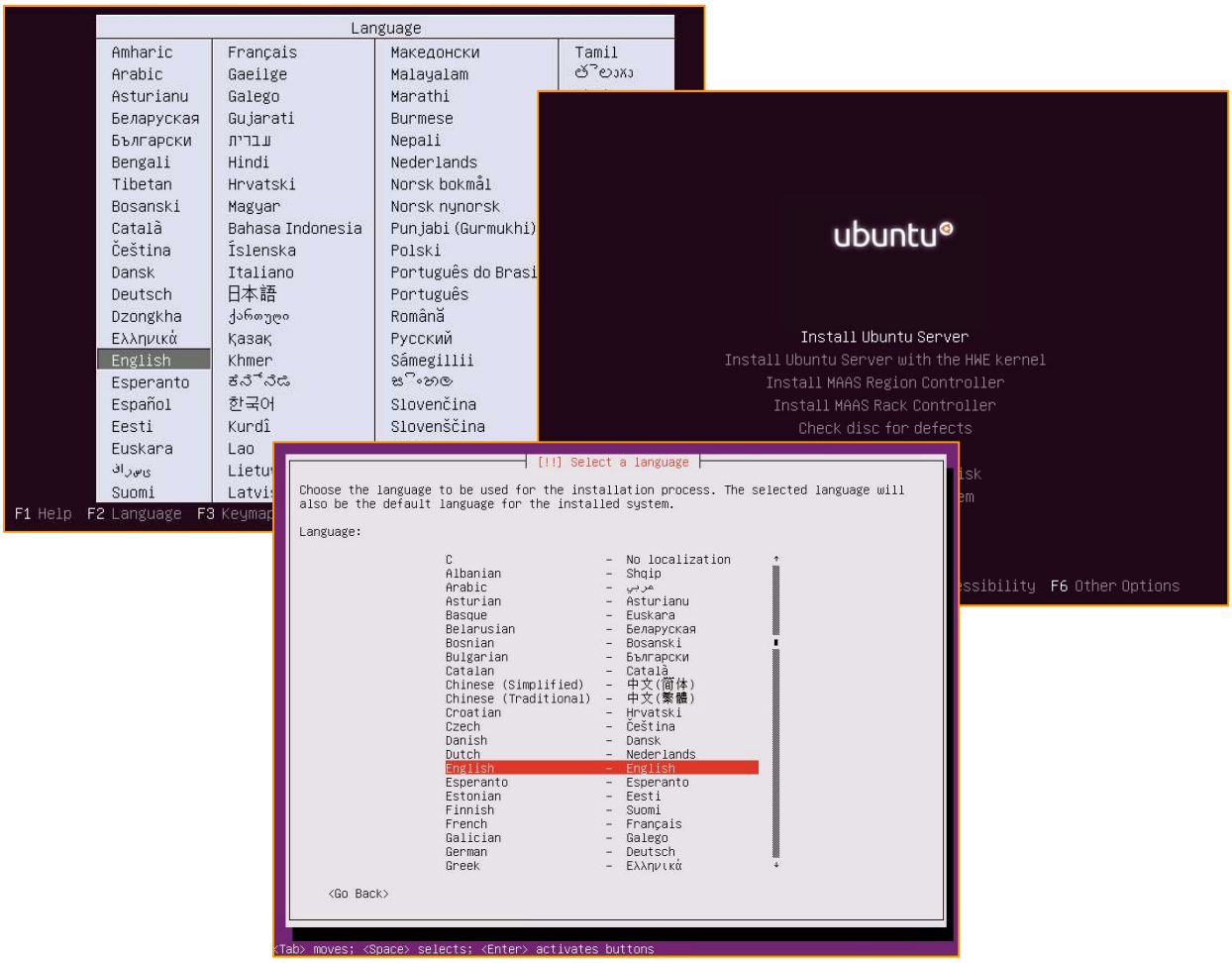
❖ Ubuntu Server 16.04 Installation

① **USB Booting 선택** # Bare-Metal

② **ISO 파일 선택** # 4 GB RAM / 32 GB Storage

③ **언어 선택 'Korean (한국어)' and 'Continue'**

④ **선택 'Install Ubuntu Server'**



메모:

- VM 설치방법 1: 우분투(Ubuntu Server/Desktop) OVA 제공
- VM 설치방법 2: 우분투(Ubuntu Server/Desktop) ISO 제공 설치
- VMware Standalone Converter 사용하여 배포
- 루트계정 활성화: sudo passwd root

3. Host 설치 (Linux)

❖ Ubuntu Server 16.04 Installation

① **Full Name ‘jalsb’**

② **User name ‘jslab’**

③ **Password ‘jslab123’**

메모:

3. Host 설치 (Linux)

❖ Ubuntu Server 16.04 Installation

① **No automatic updates**

② **OpenSSH server**

③ **User name 'jslab'**

메모:

3. Host 설치 (Linux)

❖ Ubuntu Server 16.04 Installation (선택)

① sudo apt install lm-sensors # sensors for Bare metal

② ip link show # Check Interfaces

③ Static IP Address Setting

④ Host Name Setting

- SSH Well-known Port 변경 -

```
sudo vi /etc/ssh/sshd_config

# What ports, IPs and protocols we listen for
Port 33322
```

- 계정 암호 변경 -

```
To change the root password:
sudo passwd
To change your user password:
passwd
To change other users password:
sudo passwd USERNAME
```

- 호스트 이름 변경 -

```
/etc/hostname
/etc/hosts
sudo nano /etc/hostname
sudo vi /etc/hosts
```

- 고정 IP 주소 설정-

```
sudo vi /etc/network/interfaces

# Iface ens160 inet dhcp
iface ens160 inet static
        address 192.168.0.xx
        netmask 255.255.255.0
        gateway 192.168.0.1
        dns-nameservers 8.8.8.8

cntl+o → enter →  cntl+x
sudo /etc/init.d/networking restart (or reboot)
```

- Root 계정 생성 -

```
sudo -l
passwd
sudo passwd root
```

- Putty to VyOS for sshd-

```
192.168.1.xxx @ Putty for VyOS
ssh jslab@192.168.0.yy
```

메모:

- Ubuntu Server 루트계정 활성화: sudo passwd root
- VM 이미지 Import 시 네트워크 인터페이스 확인 위한 명령어 'ip link show'
- Root 계정으로 실행 필요시 (sudo 사용 일반 계정은 실행하지 못함)
  루트계정 활성화: sudo passwd root

3. Host 설치 (Linux)

❖ Static IP for WiFi (Ubuntu 18.04)

- **OVS (Open vSwitch) Mirroring (2.8.0)**

1. **ip link show**

```
james@ubuntu18:/etc/netplan$ ip link show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
3: enp2s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel master ovs-system state UP mode DEFAULT group default qlen 1000
    link/ether 00:aa:2a:e8:34:21 brd ff:ff:ff:ff:ff:ff
4: enp3s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel master ovs-system state UP mode DEFAULT group default qlen 1000
    link/ether 00:aa:2a:e8:34:22 brd ff:ff:ff:ff:ff:ff
5: enp4s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP mode DEFAULT group default qlen 1000
    link/ether 00:aa:2a:e8:34:23 brd ff:ff:ff:ff:ff:ff
7: ovs-system: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN mode DEFAULT group default qlen 1000
    link/ether 96:be:89:0f:df:b5 brd ff:ff:ff:ff:ff:ff
8: ovs1qotom: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN mode DEFAULT group default qlen 1000
    link/ether 00:aa:2a:e8:34:20 brd ff:ff:ff:ff:ff:ff
9: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN mode DEFAULT group default
    link/ether 02:42:ee:0f:69:c6 brd ff:ff:ff:ff:ff:ff
10: wlx742f68923076: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP mode DEFAULT group default qlen 1000
    link/ether 74:2f:68:92:30:76 brd ff:ff:ff:ff:ff:ff
12: enp1s0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc fq_codel master ovs-system state DOWN mode DEFAULT group default qlen 1000
    link/ether 00:aa:2a:e8:34:20 brd ff:ff:ff:ff:ff:ff
james@ubuntu18:/etc/netplan$
```

2. **cd /etc/netplan**
3. **sudo nano 01-network-manager-all.yaml**

```
network:
  version: 2
  renderer: networkd
  wifis:
      wlx742f68923076:
              dhcp4: no
              dhcp6: no
              addresses: [192.168.0.18/24, ]
              gateway4: 192.168.0.1
              nameservers:
                  search: [vsphere.local]
                  addresses: [192.168.0.1, 8.8.8.8]
              access-points:
                  Tech-Support:
                      password: 12345*****
```

4. **sudo netplan generate**
5. **sudo netplan apply**

메모:

❖ https://www.tecmint.com/configure-network-static-ip-address-in-ubuntu/

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9. **vIDS** (Security Onion)

4. vLAN 구성 (e2e..)

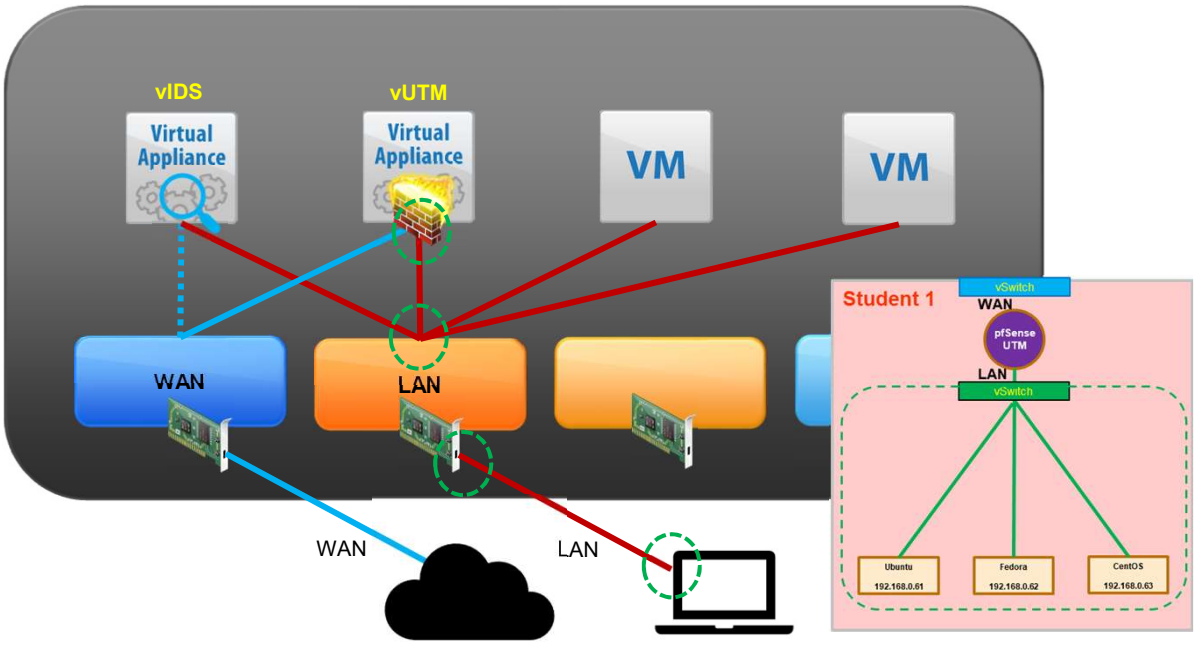
❖ vLAN 설정

① **vLAN 설정 구성 요소 확인**

② **하이퍼바이저 내의 가상스위치 포트 vLAN 설정**

③ **가상스위치에 접속하는 VM/노트북/vUTM/vIDS등 모든 기기의 인터페이스**

- Interfaces → Assignment → VLAN @ vUTM ‘pfSense’
- Interface Assignment → Available port @ vUTM ‘pfSense’
- Interfaces → enable OPT1 port → Apply @ vUTM ‘pfSense’
- Firewall → Protocol ‘any’ → Source 해당 vLAN 선택
- Service → DHCP Server



메모:

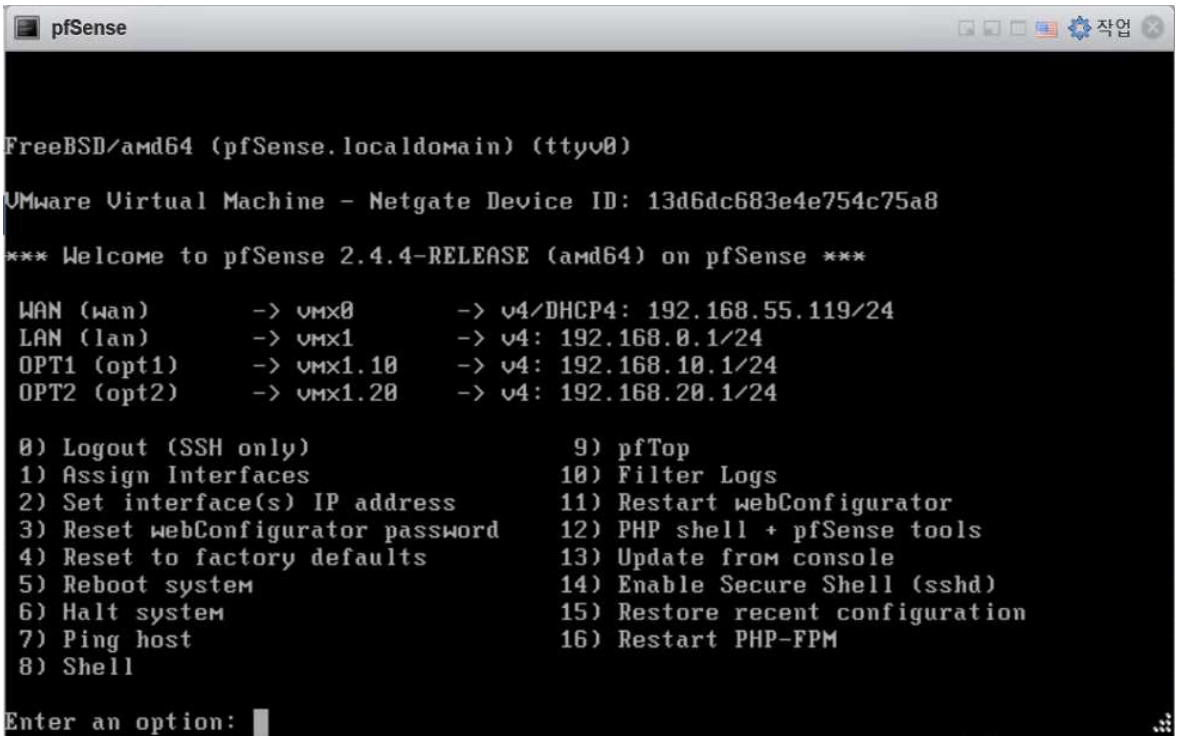
4. vLAN 구성 (e2e..)

❖ vLAN 설정

① vLAN 설정 구성 요소 확인

② 하이퍼바이저 내의 가상스위치 포트 vLAN 설정

- Interfaces → Assignment → VLAN @ vUTM ‘pfSense’
- Interface Assignment → Available port @ vUTM ‘pfSense’
- Interfaces → enable OPT1 port → Apply @ vUTM ‘pfSense’
- Interfaces → enable OPT2 port → Apply @ vUTM ‘pfSense’
- Firewall → Protocol ‘any’ → Source 해당 vLAN 선택
- Service → DHCP Server



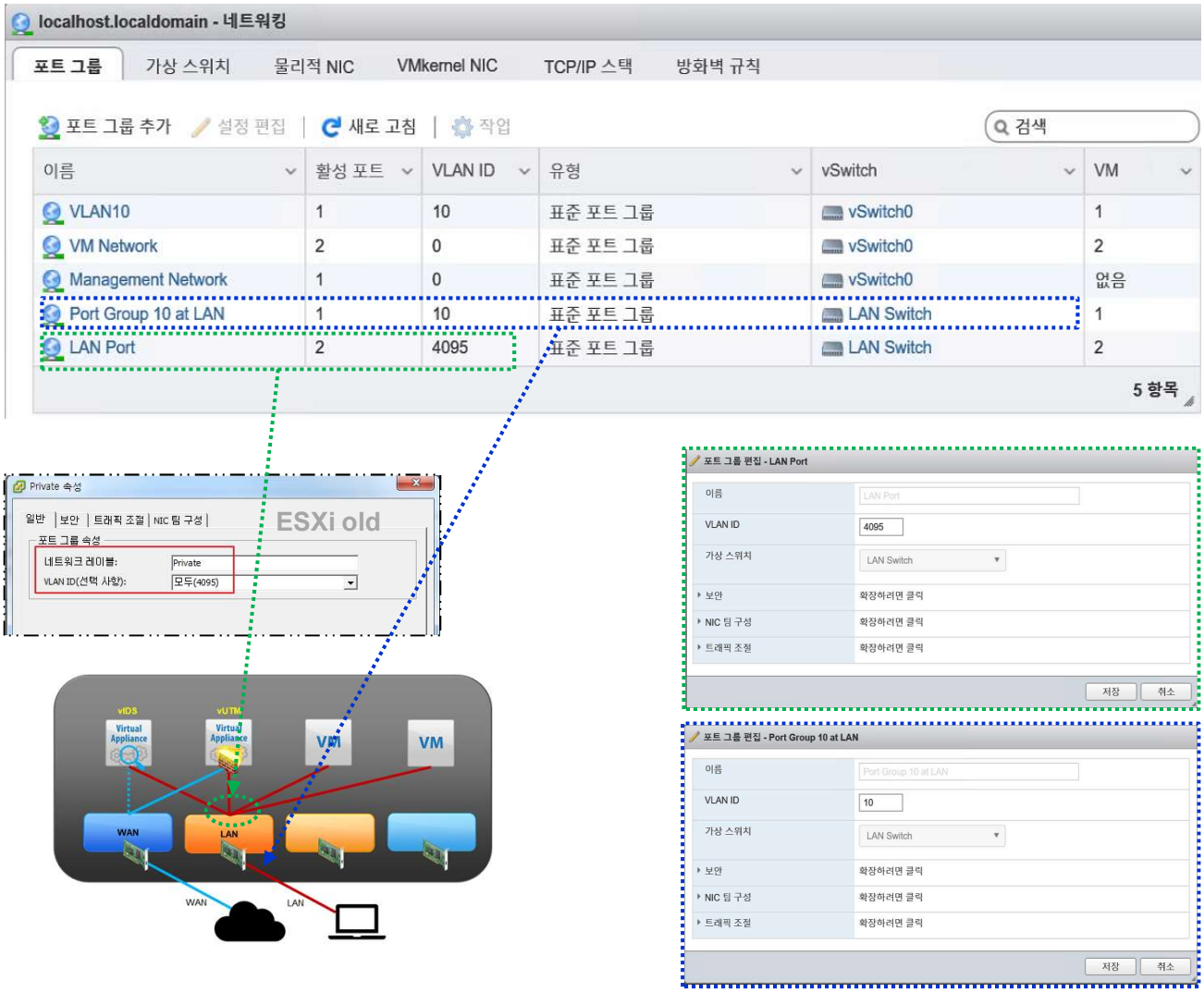
메모:

4. vLAN 구성 (e2e..)

❖ VLAN Setting @ Port Group

① **VLAN Setting @ Port Group** # ‘0’ for None ‘4095’ for All

② **Port Group의 가상 스위치 확인**



메모:

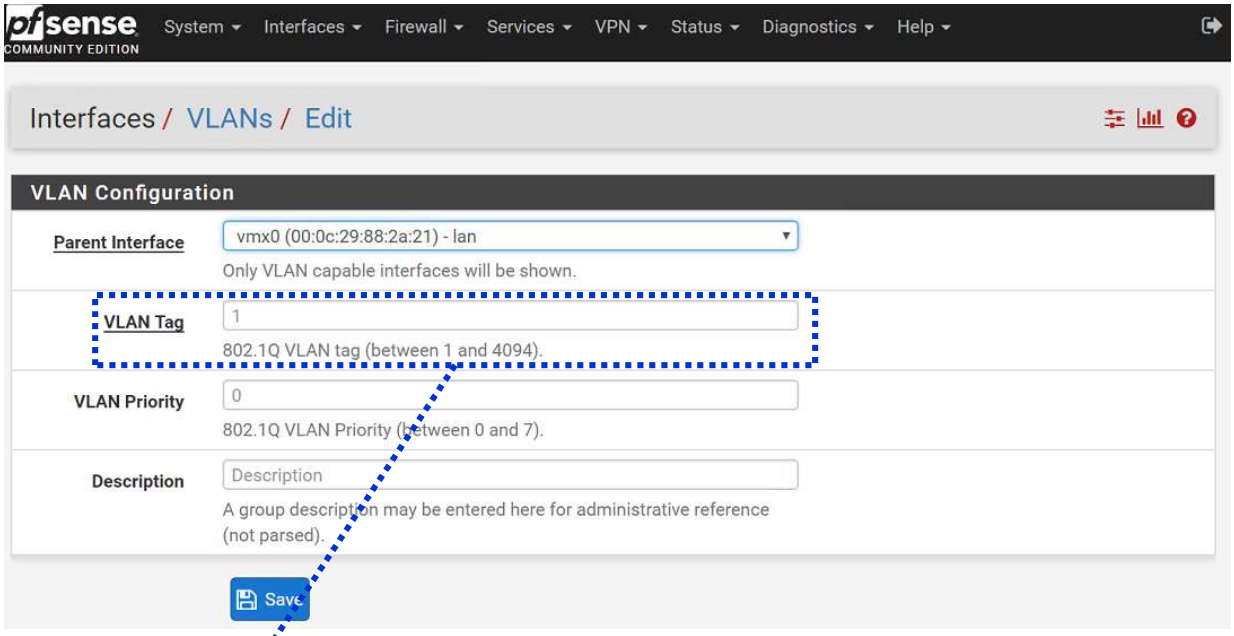
- VLAN 1개 지정 실습 진행

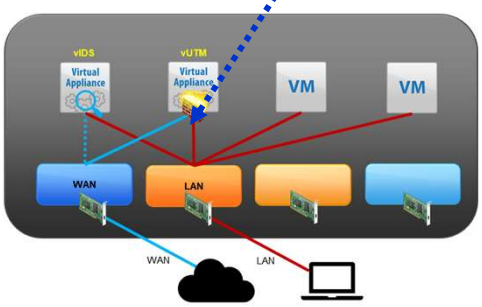
4. vLAN 구성 (e2e..)

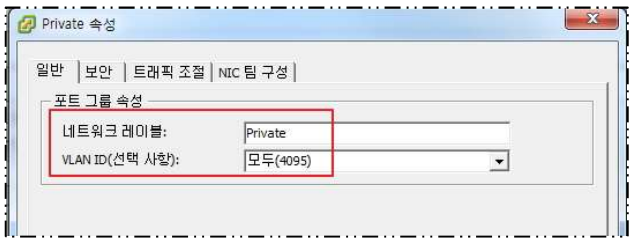
❖ VLAN Setting @ vUTM ‘pfSense’

① **VLAN Setting @ vUTM ‘pfSense’** # 1~4094

② **vUTM ‘pfSense’의 Parent Interface 확인**







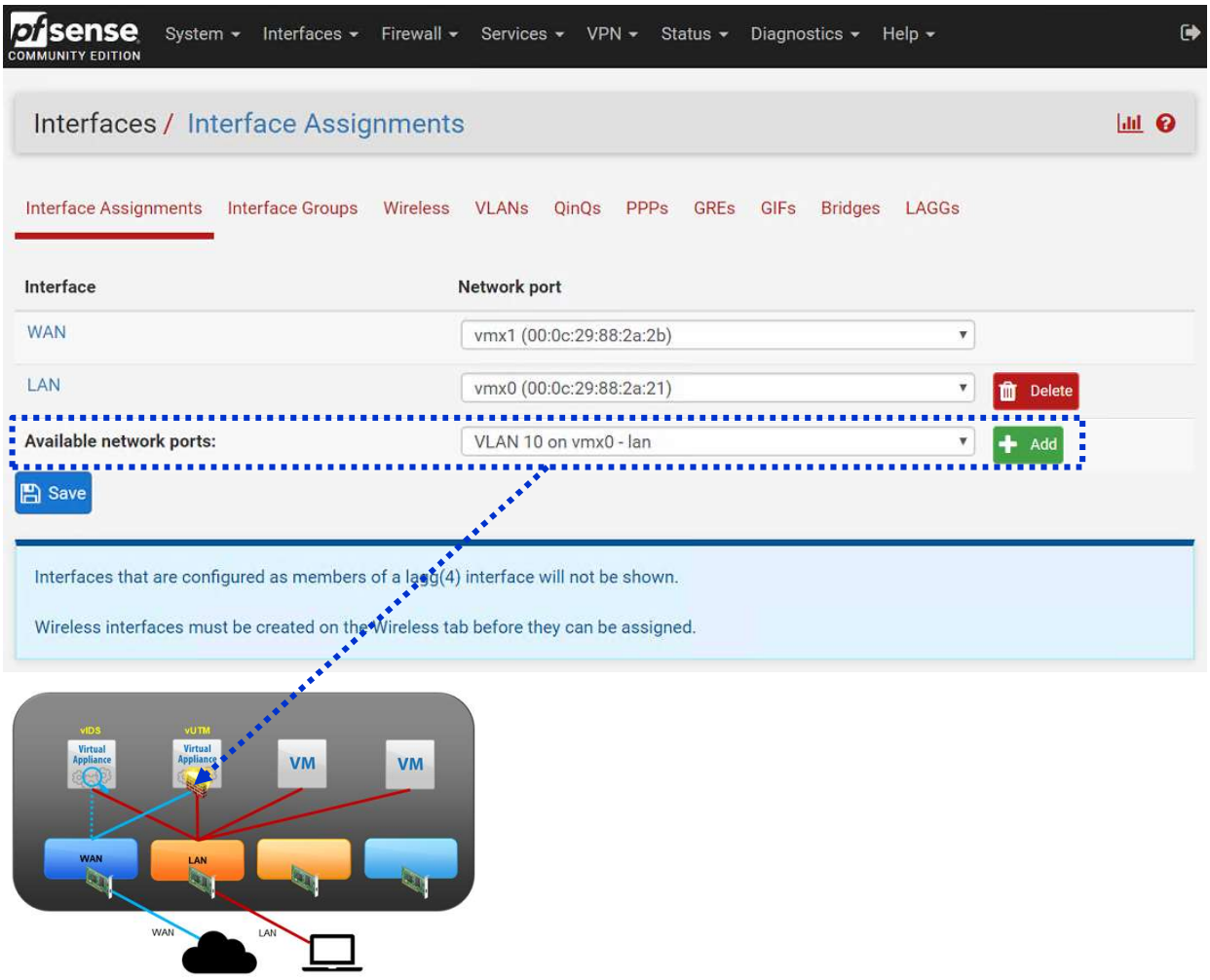
메모:

- VLAN Tag : ‘0’ for None ‘4095’ for All

4. vLAN 구성 (e2e..)

❖ VLAN 인터페이스에 추가

① **VLAN 인터페이스에 추가**
② **네트워크 포트 확인**



메모:

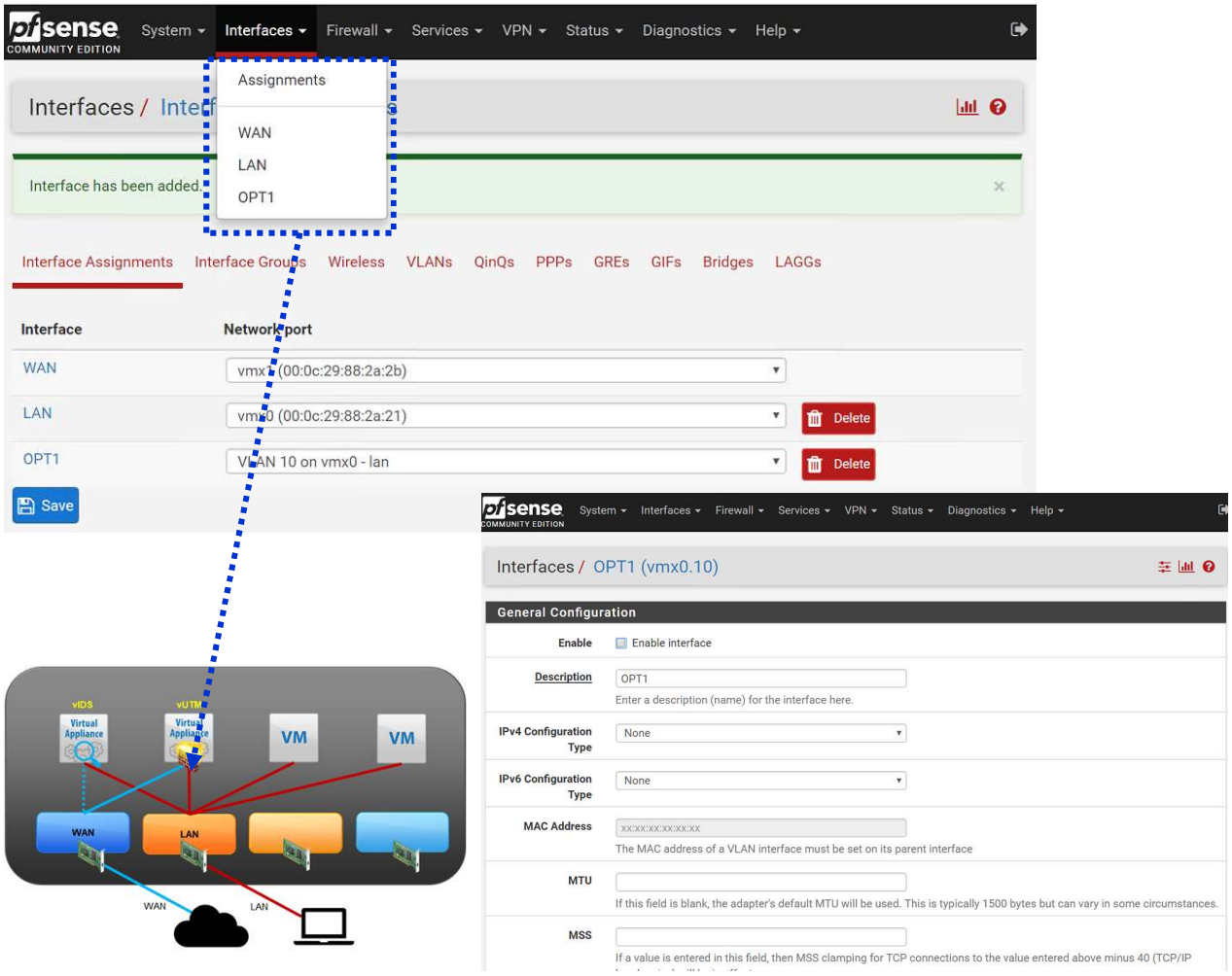
- VM 설치방법 1: 우분투(Ubuntu Server/Desktop) OVA 제공
- VM 설치방법 2: 우분투(Ubuntu Server/Desktop) ISO 제공 설치
- VMware Standalone Converter 사용하여 배포
- 루트계정 활성화: sudo passwd root

4. vLAN 구성 (e2e..)

❖ 인터페이스 생성

① 인터페이스 생성 확인

② 인터페이스 활성화(Enable) 후 저장(Save) 변경 저장(Apply Changes)



메모:

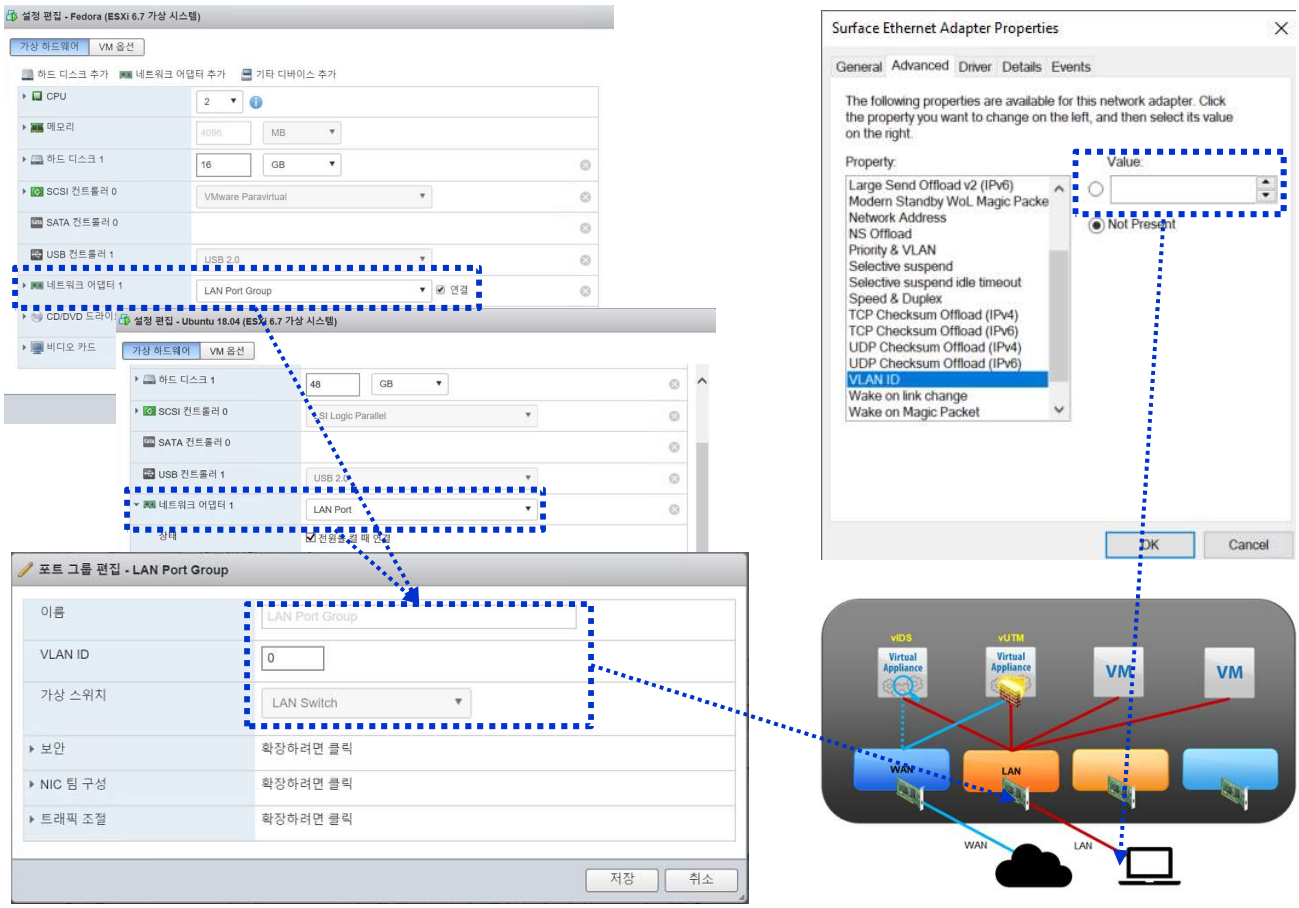
4. vLAN 구성 (e2e..)

❖ 단말기 VLAN 설정

① **VLAN Setting @ Port Group** # 1~4094

② **언어 선택 'Korean (한국어)' and 'Continue'**

③ **선택 'Install Ubuntu Server'**



메모:

- VLAN Tag : '0' for None '4095' for All

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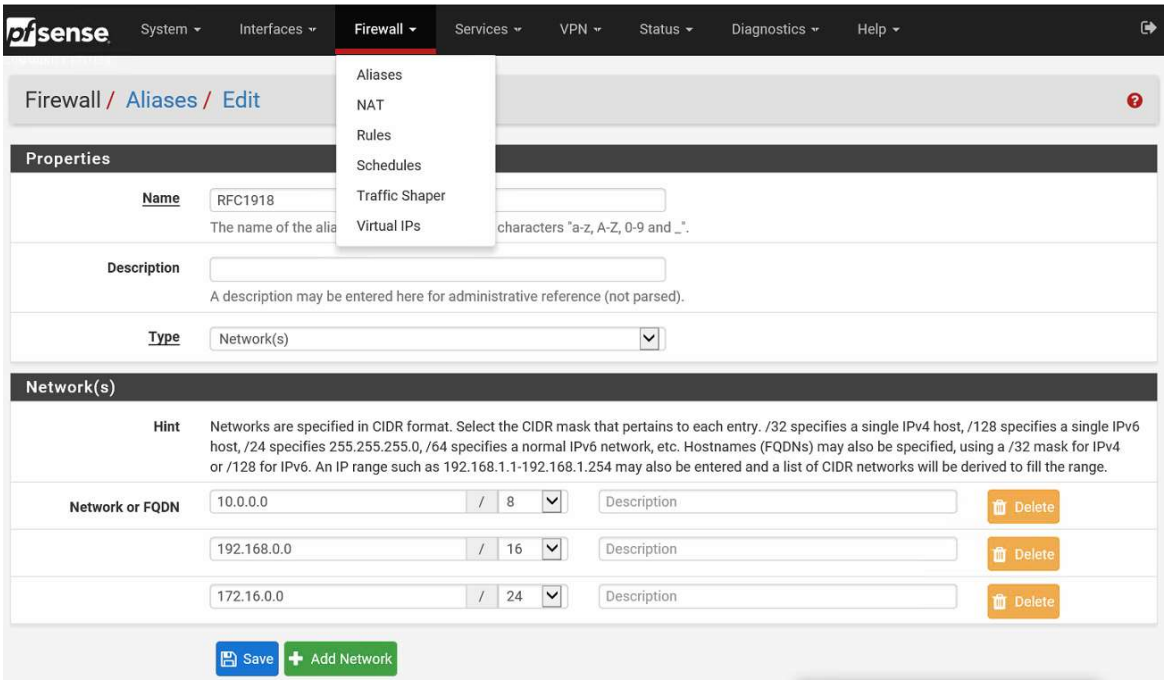
6. vIPS (snort)
7. 웹필터 (SquidGuard)
8. ntopng (플로우 모니터)
9. vIDS (Security Onion)

5. vFW (pfSense..)

❖ Firewall

① **Alias RFC1918 지정**

② **Click Button “Apply Changes”**



메모:

- RFC1918: 인터넷 어드레싱 아키텍처에서 사설 IP 주소 공간을 이용하는 표준

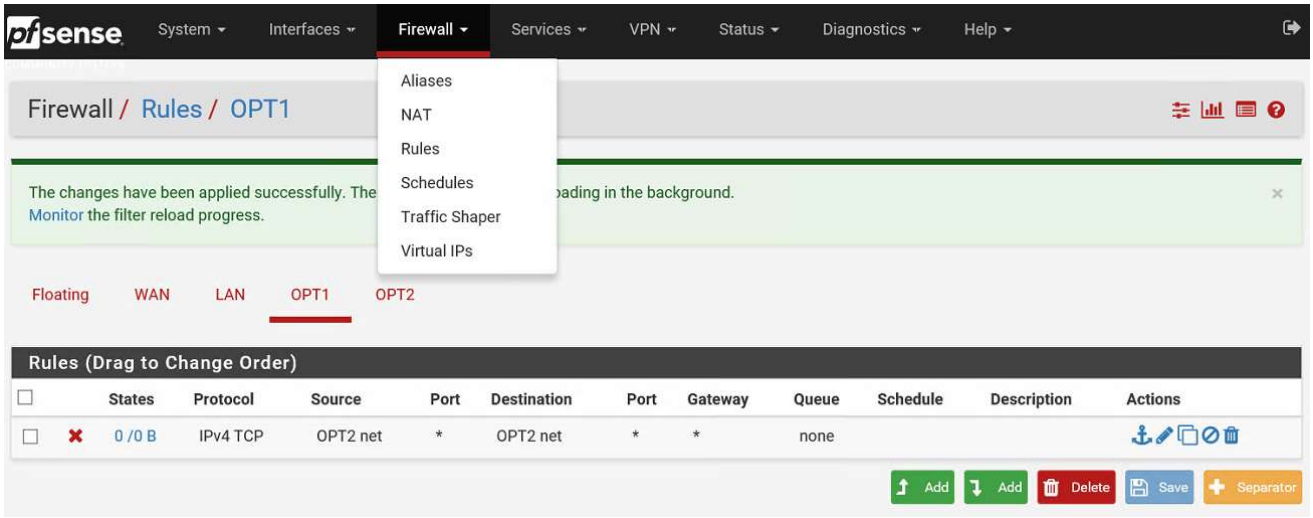
RFC1918 이름	IP 주소 범위	주소 개수	클래스 내용	최대 사이더 블록 (서브넷 마스크)	호스트 ID 크기
24비트 블록	10.0.0.0 – 10.255.255.255	16,777,216	클래스 A 하나	10.0.0.0/8 (255.0.0.0)	24 비트
20비트 블록	172.16.0.0 – 172.31.255.255	1,048,576	16개의 인접 클래스 B	172.16.0.0/12 (255.240.0.0)	20 비트
16비트 블록	192.168.0.0 – 192.168.255.255	65,536	256개의 인접 클래스 C	192.168.0.0/16 (255.255.0.0)	16 비트

5. vFW (pfSense..)

❖ Firewall

① **vLAN간 차단**

② **Click Button “Apply Changes”**



메모:

- RFC1918: 인터넷 어드레싱 아키텍처에서 사설 IP 주소 공간을 이용하는 표준

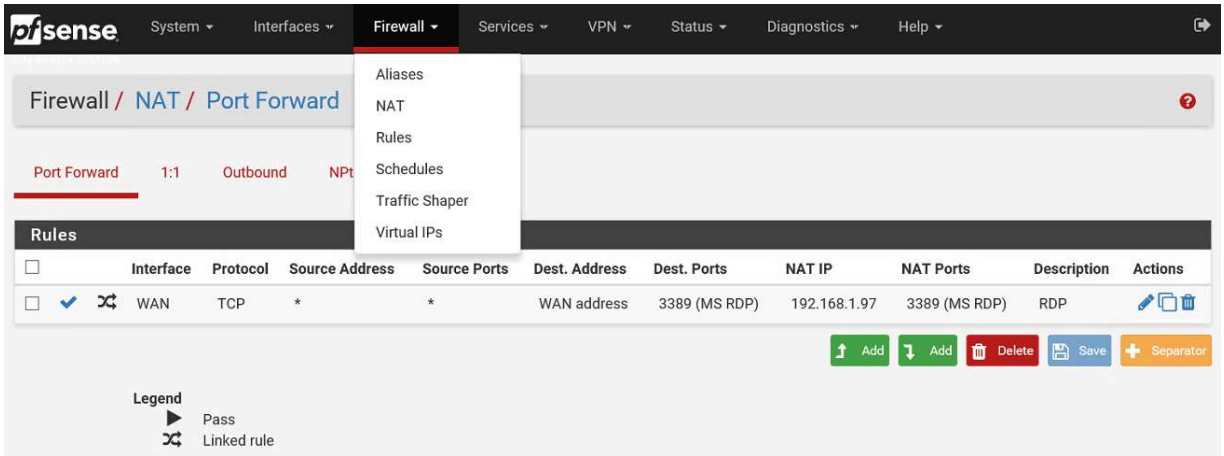
RFC1918 이름	IP 주소 범위	주소 개수	클래스 내용	최대 사이더 블록 (서브넷 마스크)	호스트 ID 크기
24비트 블록	10.0.0.0 – 10.255.255.255	16,777,216	클래스 A 하나	10.0.0.0/8 (255.0.0.0)	24 비트
20비트 블록	172.16.0.0 – 172.31.255.255	1,048,576	16개의 인접 클래스 B	172.16.0.0/12 (255.240.0.0)	20 비트
16비트 블록	192.168.0.0 – 192.168.255.255	65,536	256개의 인접 클래스 C	192.168.0.0/16 (255.255.0.0)	16 비트

5. vFW (pfSense..)

❖ Firewall

① **NAT**

② **외부로 지정한 서버 서비스를 노출**



메모:

- RFC1918: 인터넷 어드레싱 아키텍처에서 사설 IP 주소 공간을 이용하는 표준

RFC1918 이름	IP 주소 범위	주소 개수	클래스 내용	최대 사이더 블록 (서브넷 마스크)	호스트 ID 크기
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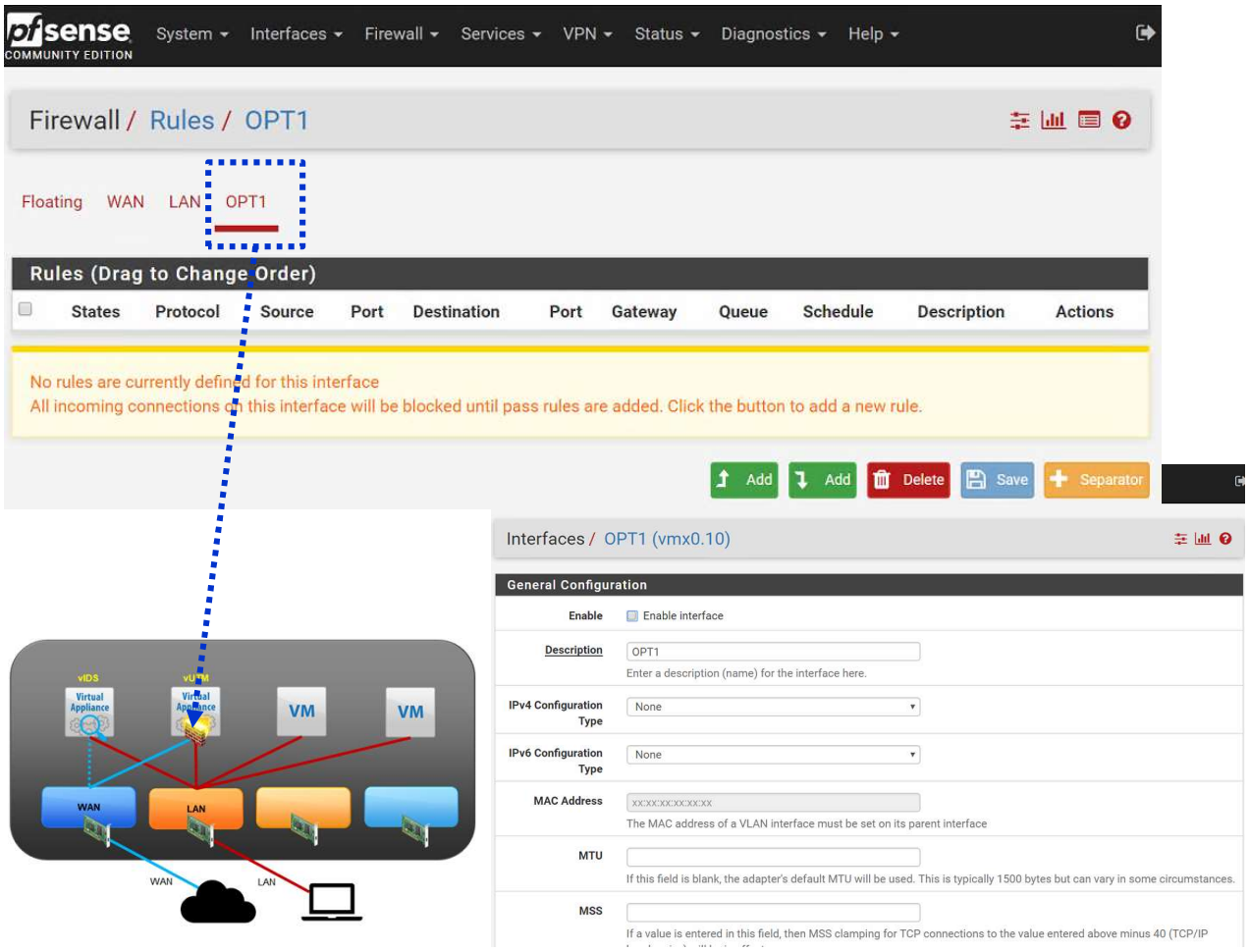
5. vFW (pfSense..)

❖ Firewall

① 방화벽에서 OPT1(VLAN1) 인터페이스 설정
② 방화벽에서 OPT2(VLAN2) 인터페이스 설정



메모:

- E2e는 원격지의 기관들이 서로 VLAN기반으로 연결 가능

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1. 실습 환경 준비
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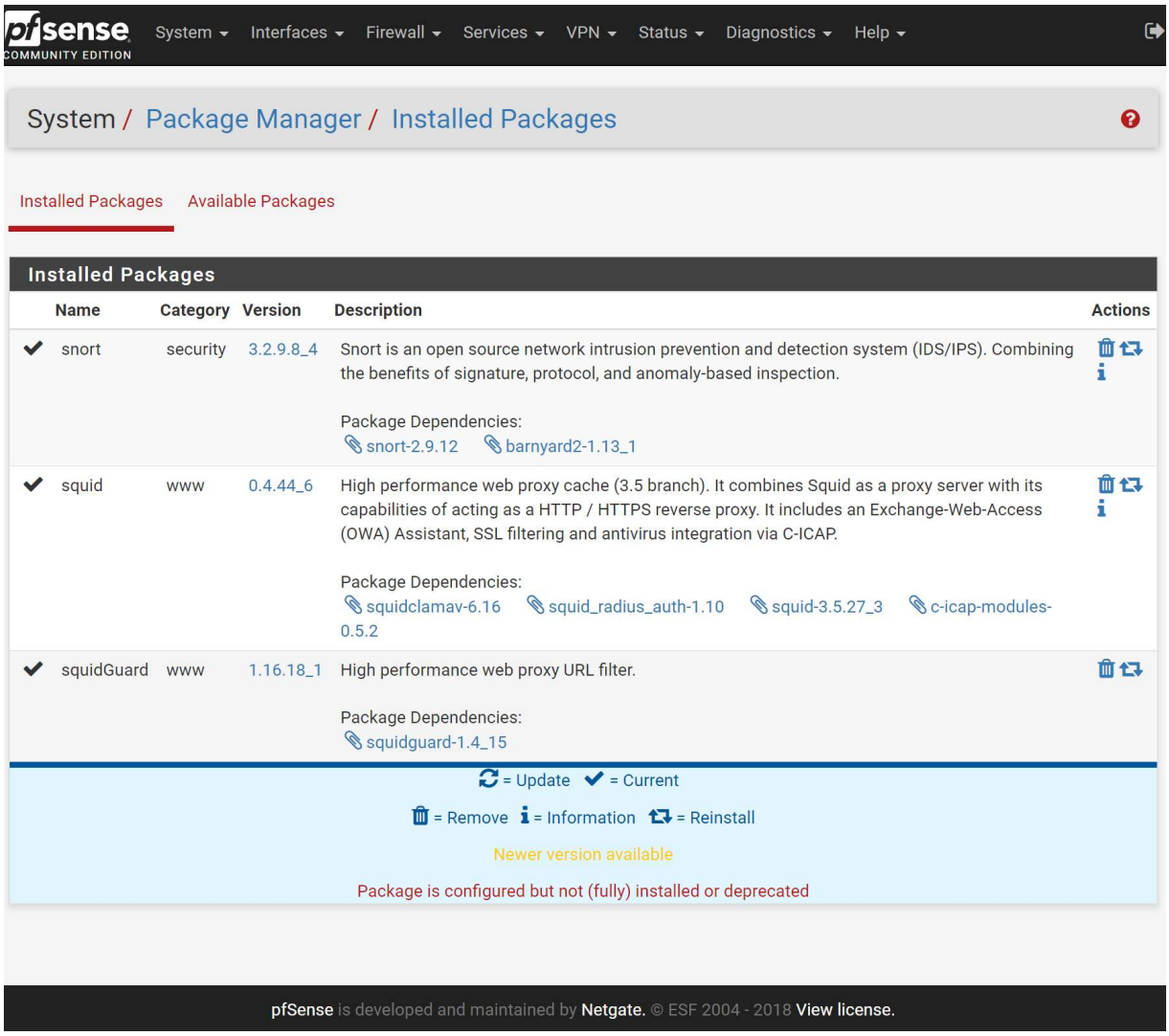
5. **vFW** (pfSense..)
6. **vIPS** (snort)
7. **웹필터** (SquidGuard)
8. **ntopng** (플로우 모니터)
9. **vIDS** (Security Onion)

6. vIPS (snort)

❖ 패키지 설치

① **Package Manager**

② **Available Packages**



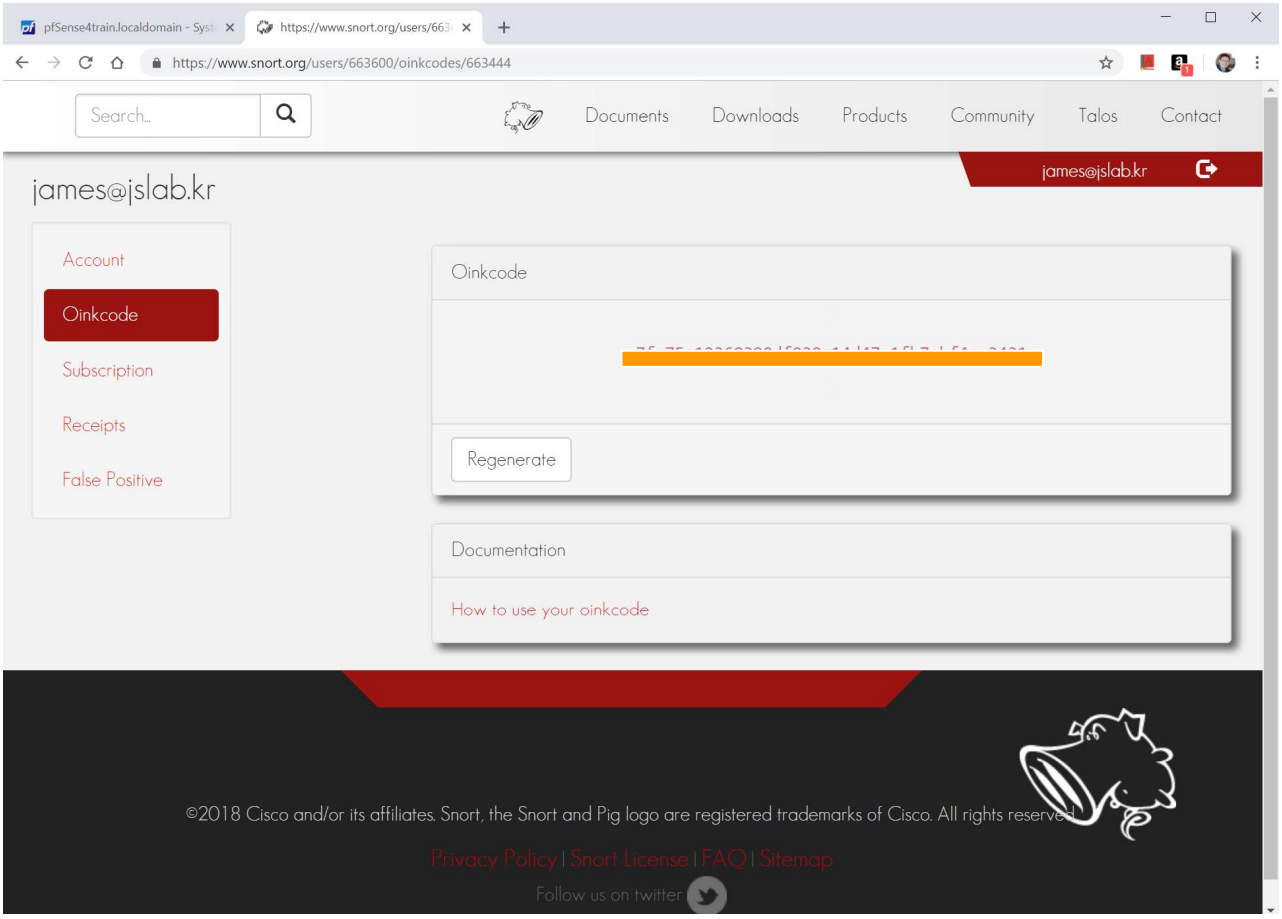
메모:

6. vIPS (snort)

❖ Oinkcode

① **https://www.snort.org/**

② **Oinkcode**



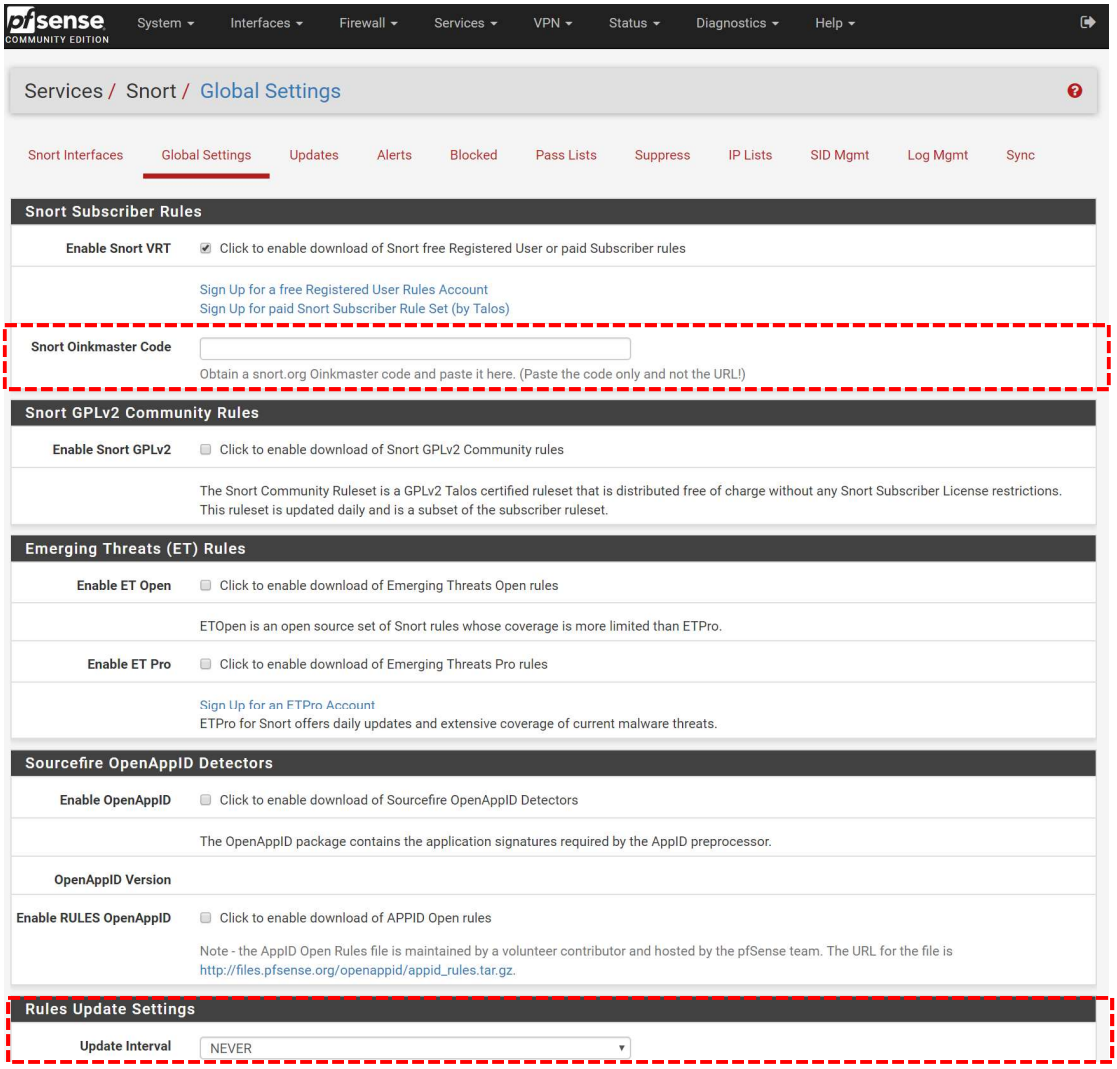
메모:

6. vIPS (snort)

❖ Global settings

① **Oinkcode**

② **Update Interval**



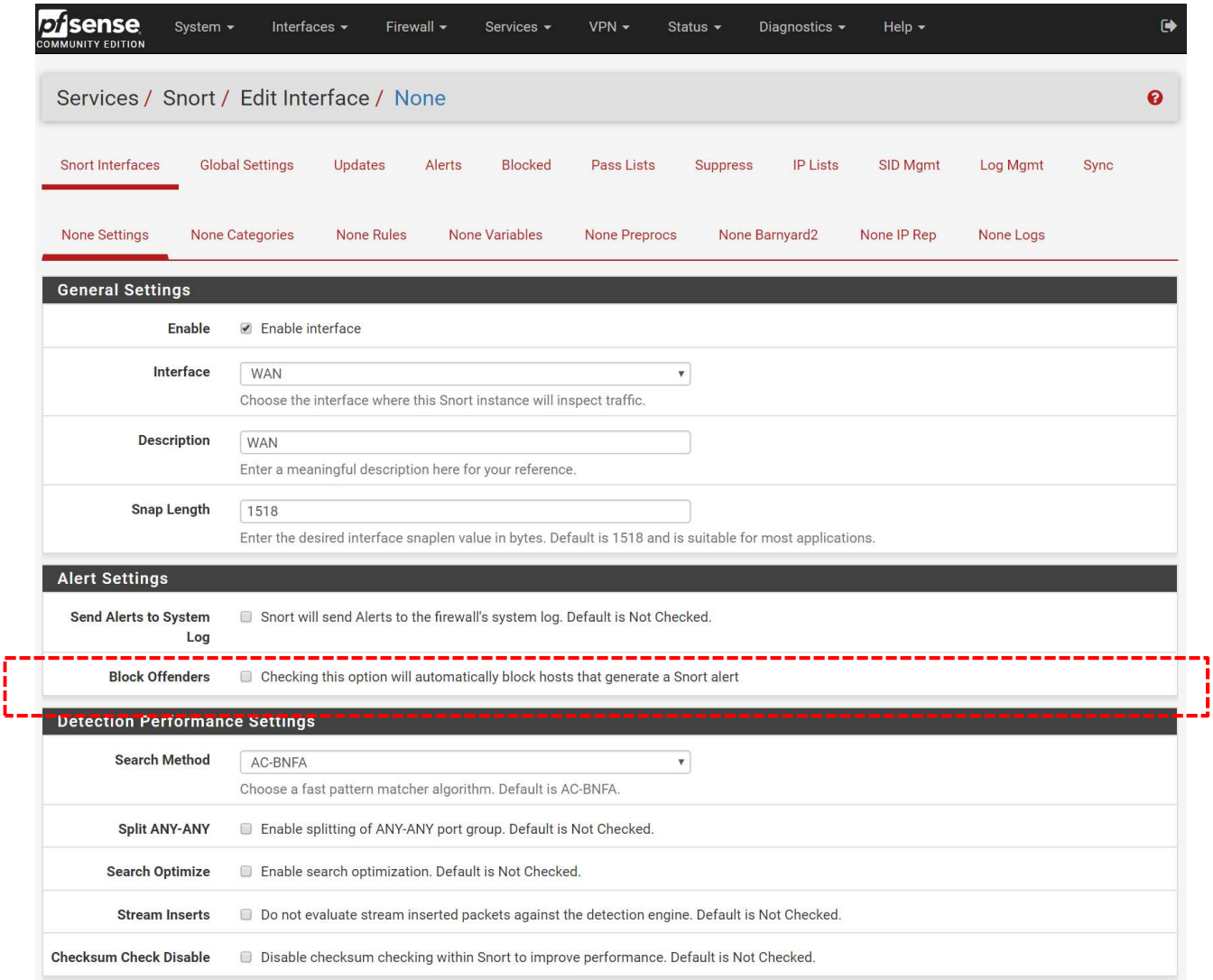
메모:

6. vIPS (snort)

❖ Block offender

① **Snort Interfaces**

② **Alert Settings**



메모:

- RFC1918: 인터넷 어드레싱 아키텍처에서 사설 IP 주소 공간을 이용하는 표준

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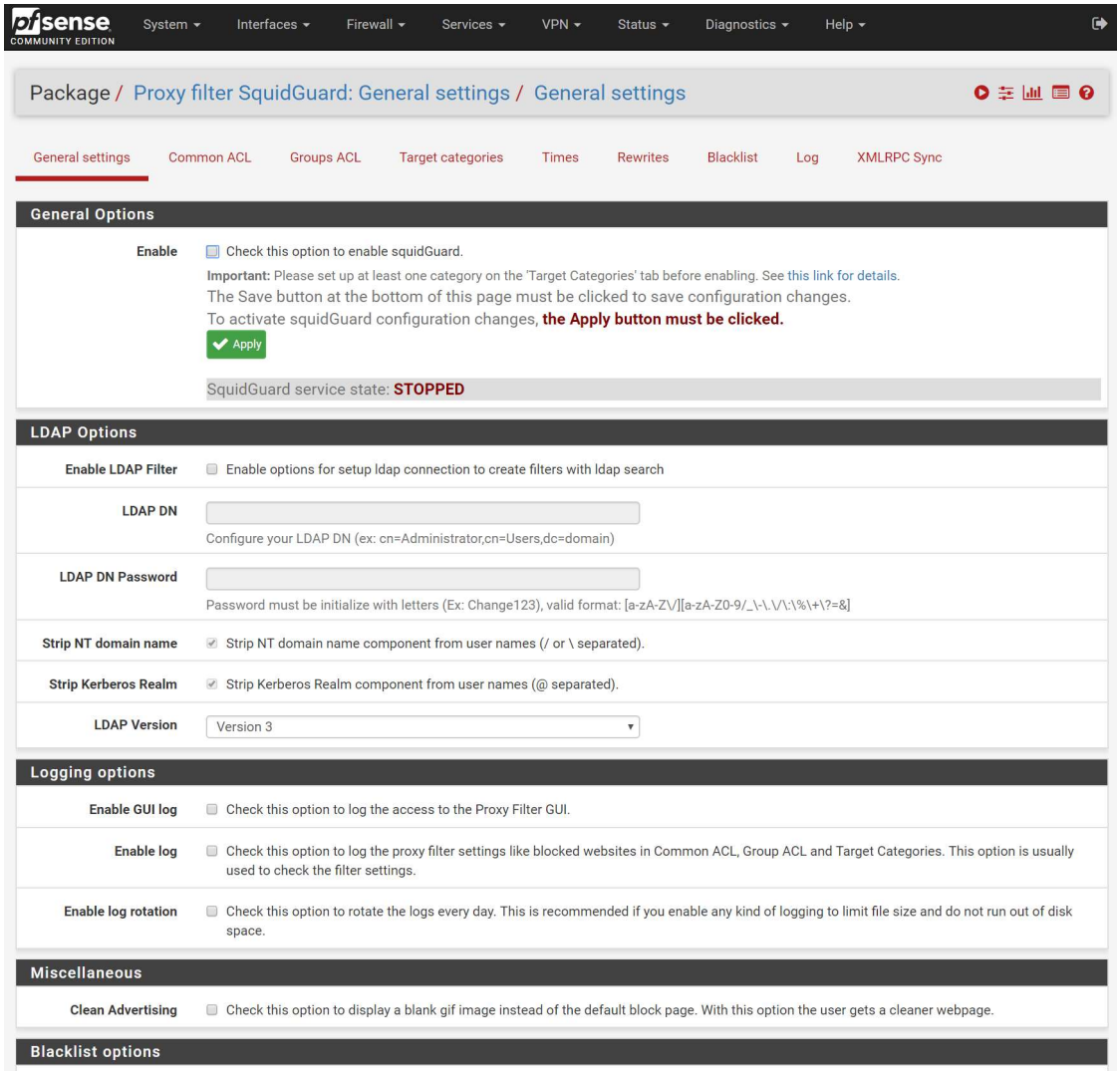
8. **ntopng** (플로우 모니터)
9. **vIDS** (Security Onion)

7. 웹필터 (SquidGuard)

❖ 웹필터

① **Global Setting**

② **활성화**



메모:

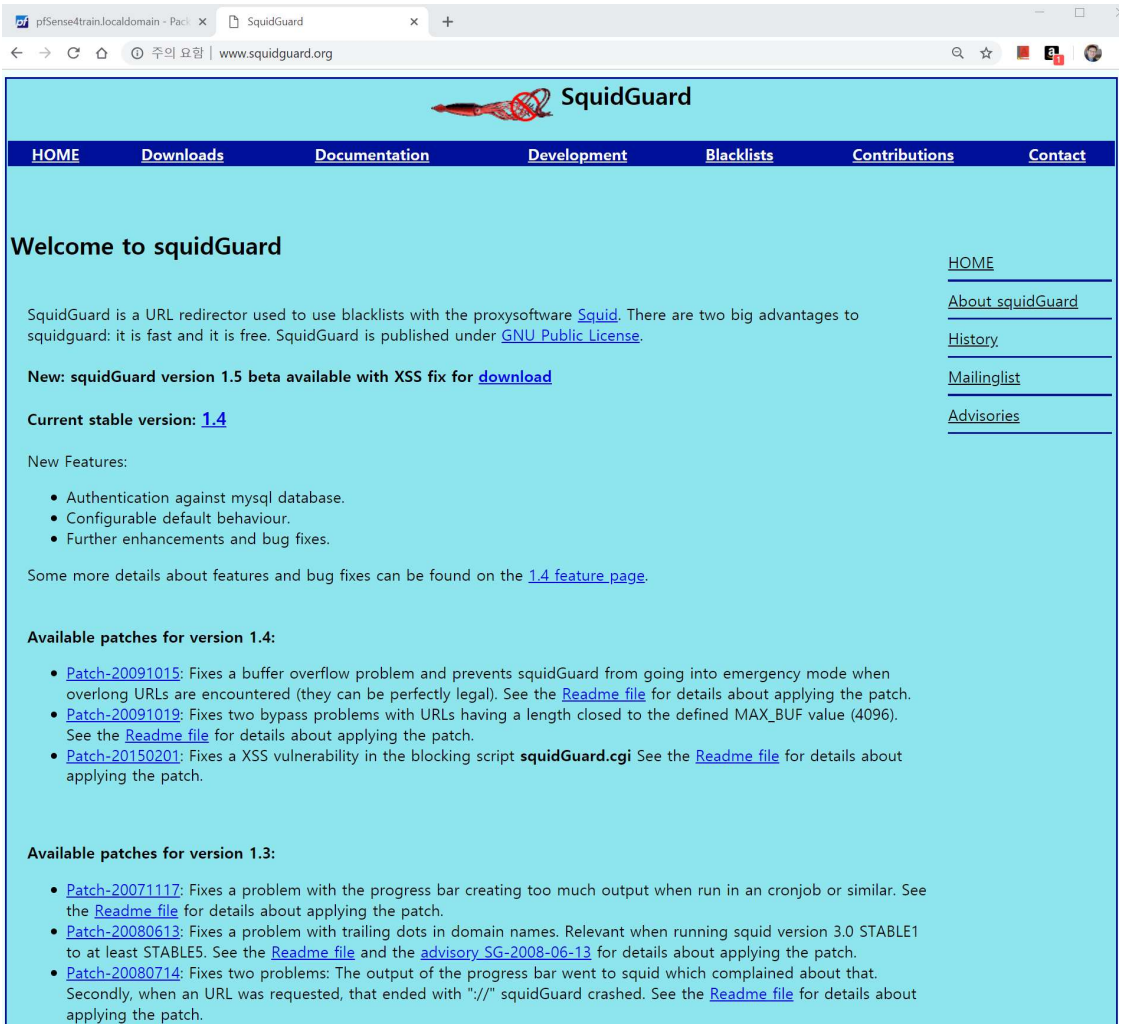
- SquidProxy 우선 실행
- Transparent Mode 확인
- http://www.squidguard.org/

7. 웹필터 (SquidGuard)

❖ 웹필터

① http://www.squidguard.org

② 외부로 지정한 서버 서비스를 노출



메모:

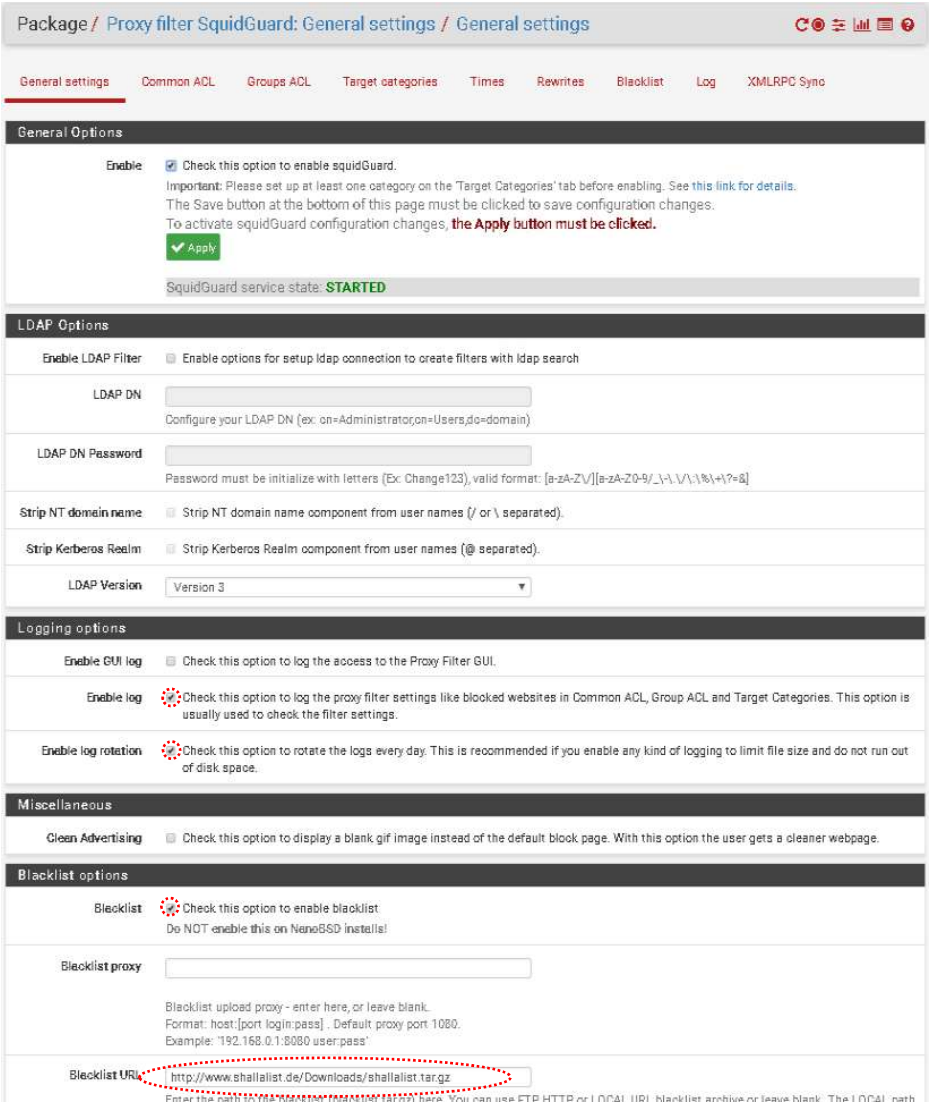
- http://www.squidguard.org/

7. 웹필터 (SquidGuard)

❖ 웹필터

① **Log**

② **http://www.shallalist.de/Downloads/shallalist.tar.gz**



메모:

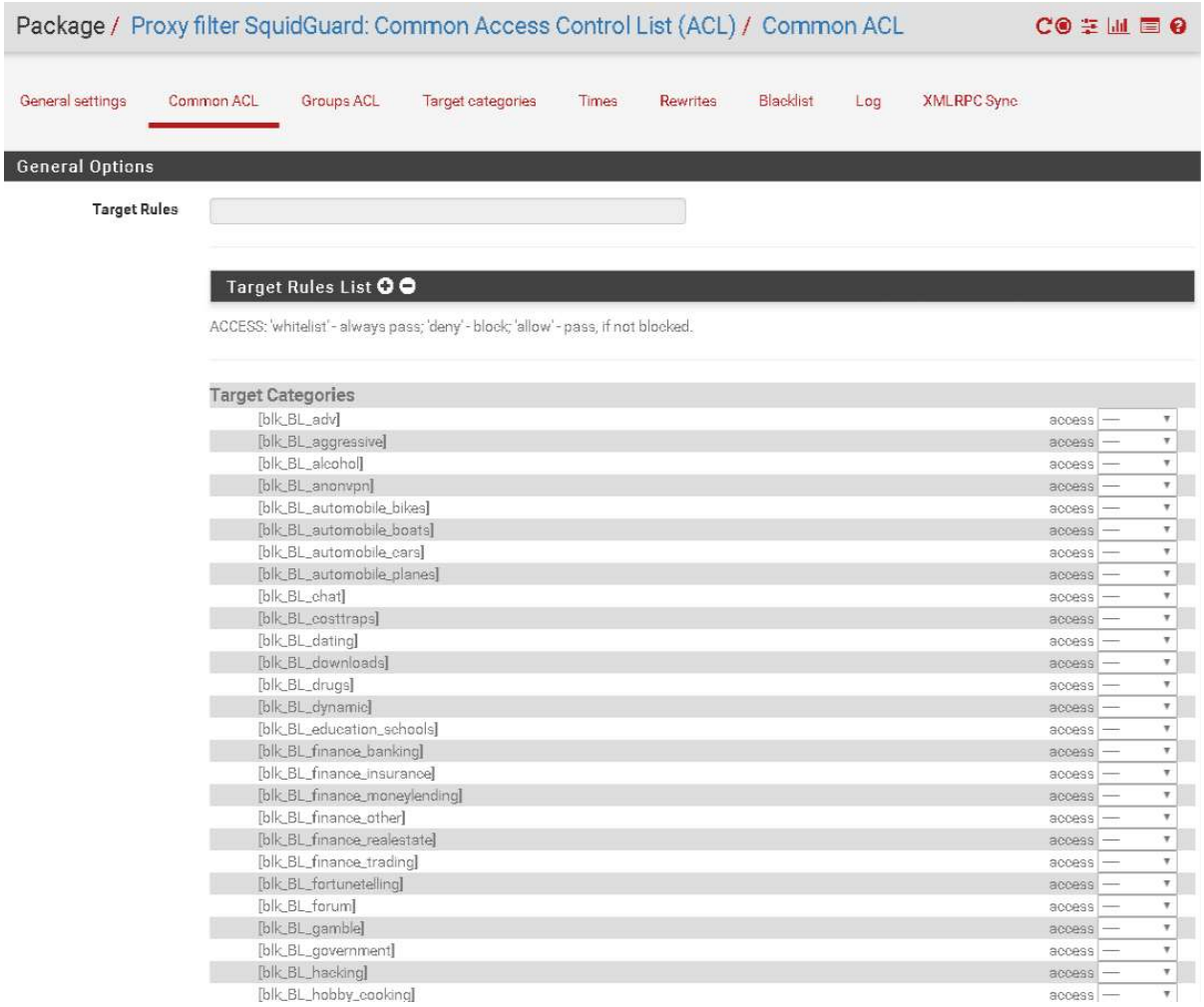
- http://www.shallalist.de
- http://www.shallalist.de/Downloads/shallalist.tar.gz

7. 웹필터 (SquidGuard)

❖ 웹필터

① **Log**

② **http://www.shallalist.de/Downloads/shallalist.tar.gz**



메모:

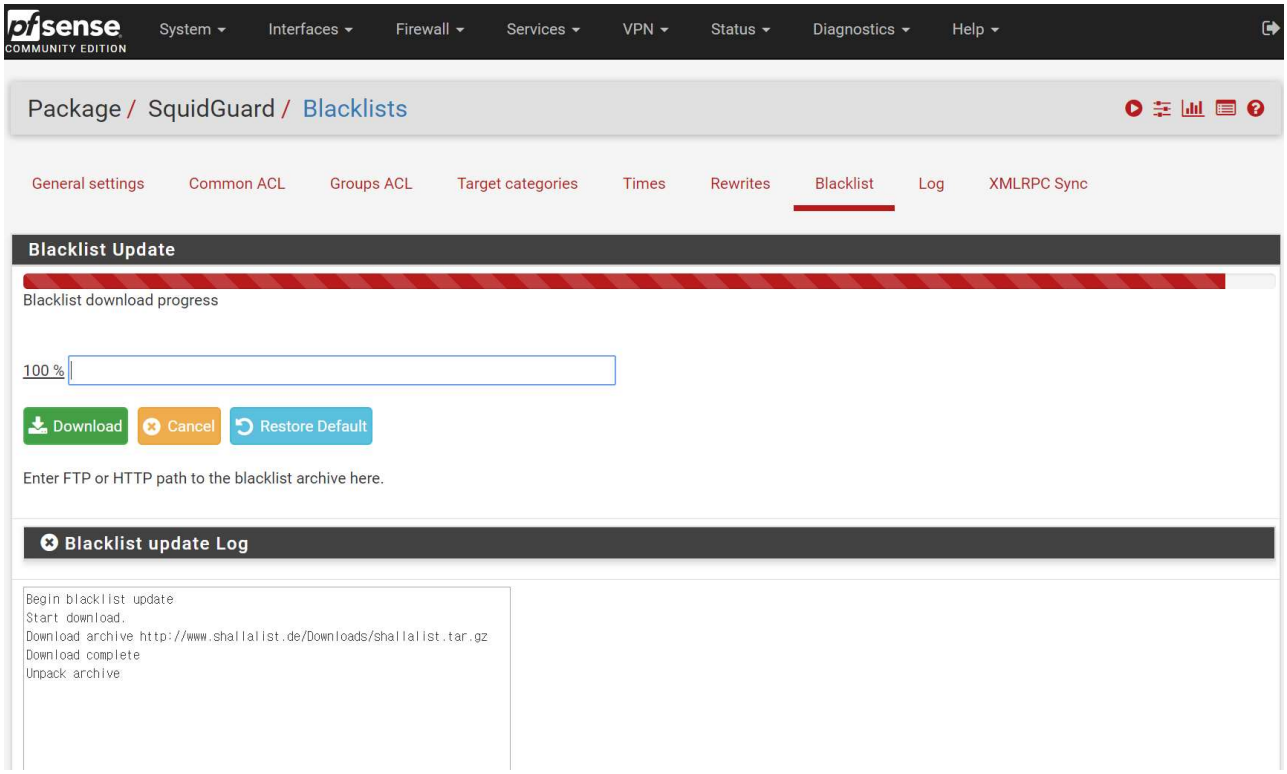
- http://www.shallalist.de
- http://www.shallalist.de/Downloads/shallalist.tar.gz

7. 웹필터 (SquidGuard)

❖ 웹필터

① **Blacklist URL**

② **http://www.shallalist.de/Downloads/shallalist.tar.gz**



메모:

- http://www.shallalist.de
- http://www.shallalist.de/Downloads/shallalist.tar.gz

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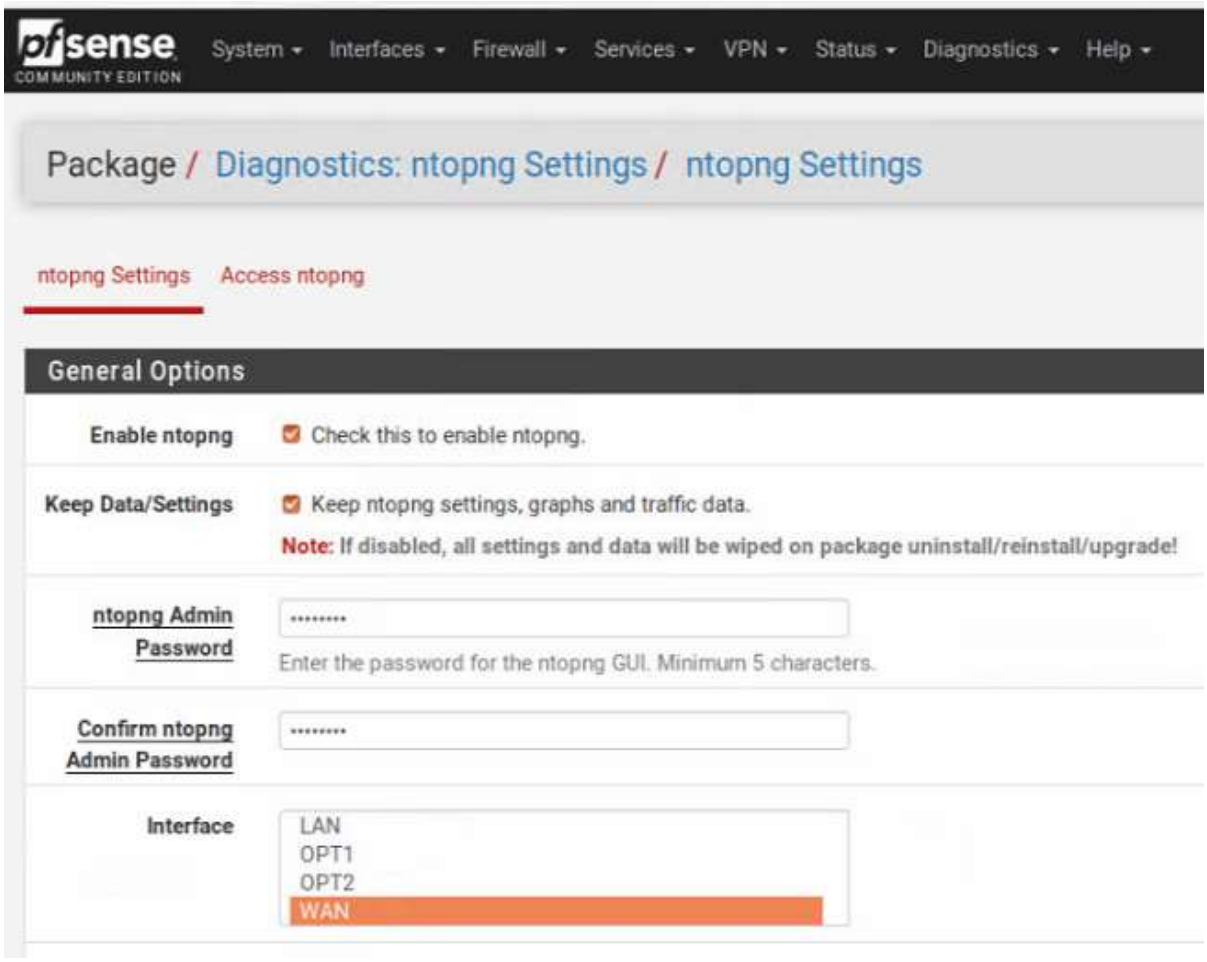
5. vFW (pfSense..)
6. vIPS (snort)
7. 웹필터 (SquidGuard)
8. ntopng (플로우 모니터)
9. vIDS (Security Onion)

8. ntopng (플로우 모니터)

❖ ntopng setting

① **Diagnostic → ntopng settings**
② **Enable @ an interface**
③ **save**
④ **Access ntopng** # http://127.0.0.1:3000 with 'admin / admin'



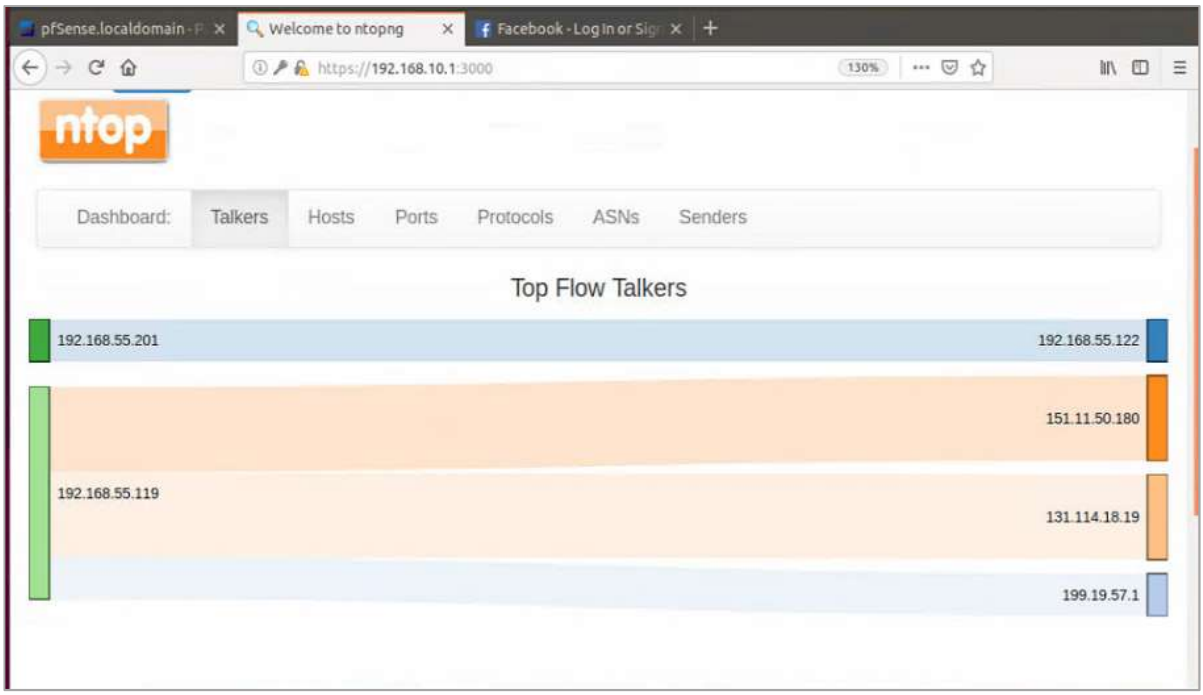
메모:

- 초기 관리 계정 / 암호 'admin / admin'

8. ntopng (플로우 모니터)

❖ ntopng Access

① 대쉬보드
② Flow
③ Host



메모:

- http://www.shallalist.de
- http://www.shallalist.de/Downloads/shallalist.tar.gz

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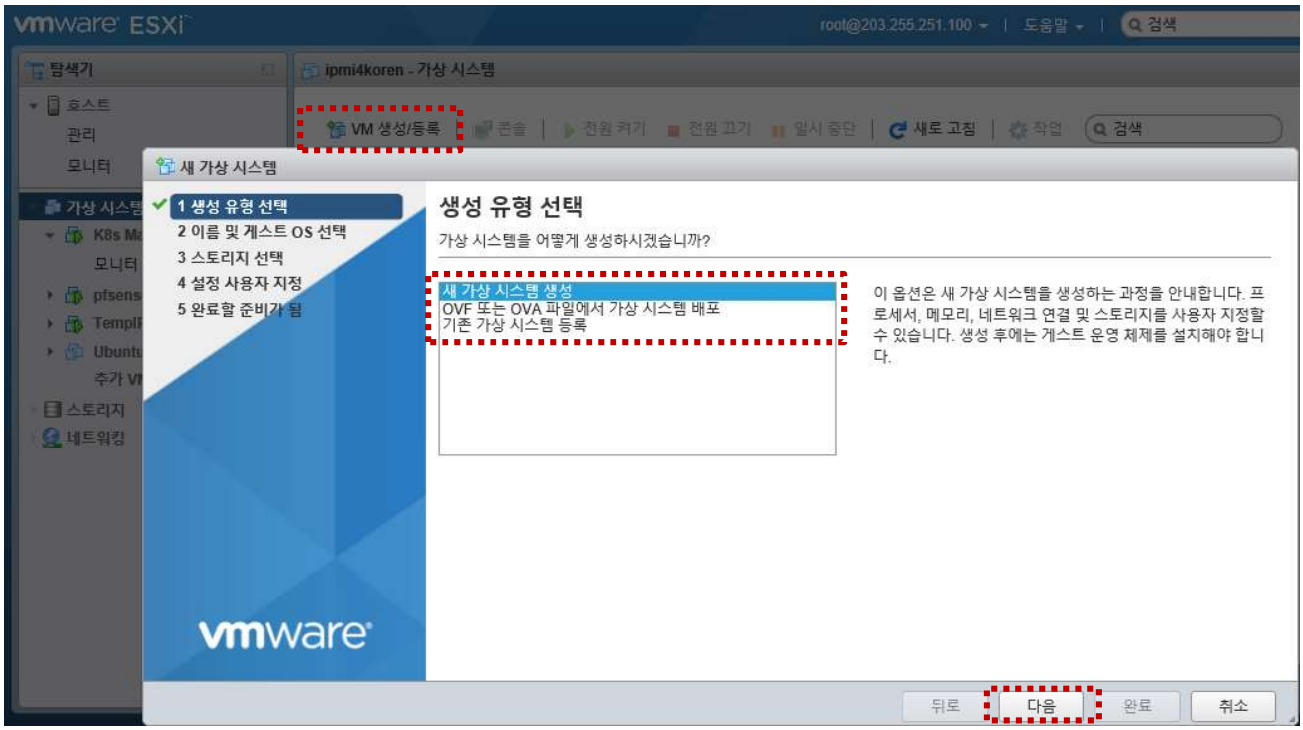
9. **vIDS** (Security Onion)

8. vIDS

❖ Security Onion @ Hypervisor

① VM 생성 등록
② 새 가상 시스템 생성
③ 다음



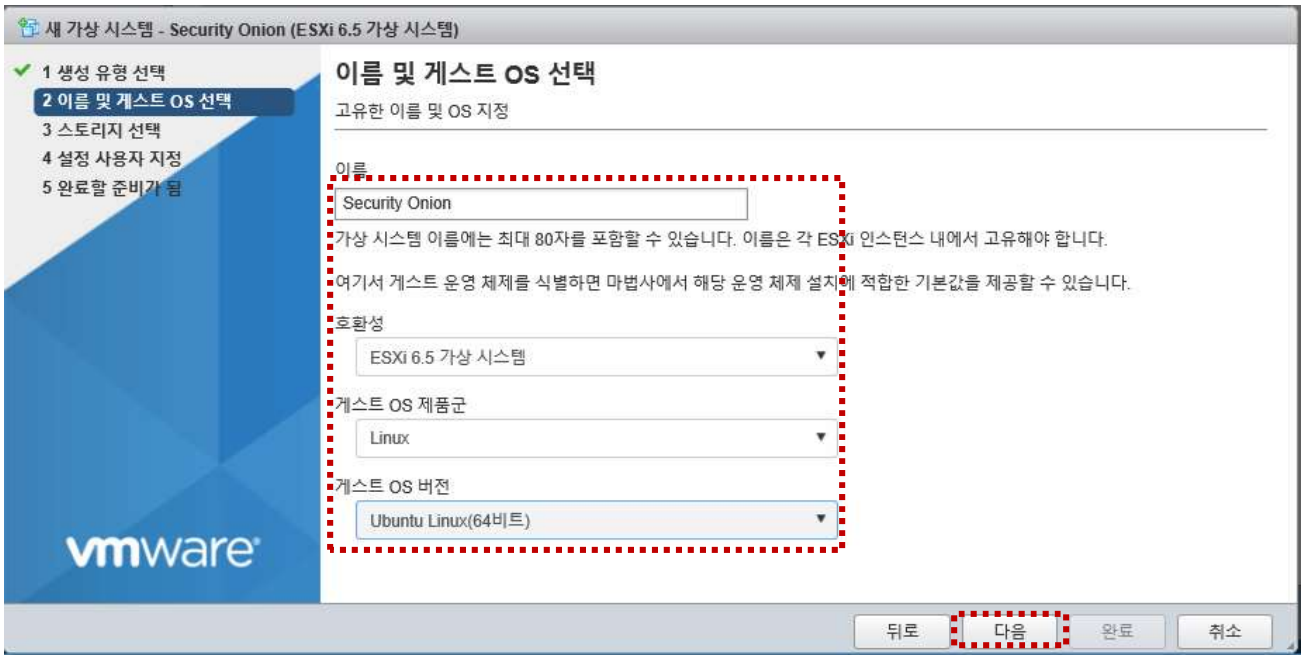
메모:

- ESXi 다운로드 주소: https://my.vmware.com/en/web/vmware/evalcenter?p=free-esxi6
- 디스크 이미지 굽기: Rufus 도구 사용 https://rufus.akeo.ie/
- Disk Imager https://sourceforge.net/projects/win32diskimager/files/latest/download
- USB 부팅 제가동은 전원 off/on (전원 케이블 포함)필요함
- https://github.com/Security-Onion-Solutions/security-onion/blob/master/Verify_ISO.md

8. vIDS

❖ Security Onion @ Hypervisor

① 이름
② 호환성
③ 게스트 OS 제품군
④ 게스트 OS 버전
⑤ 다음



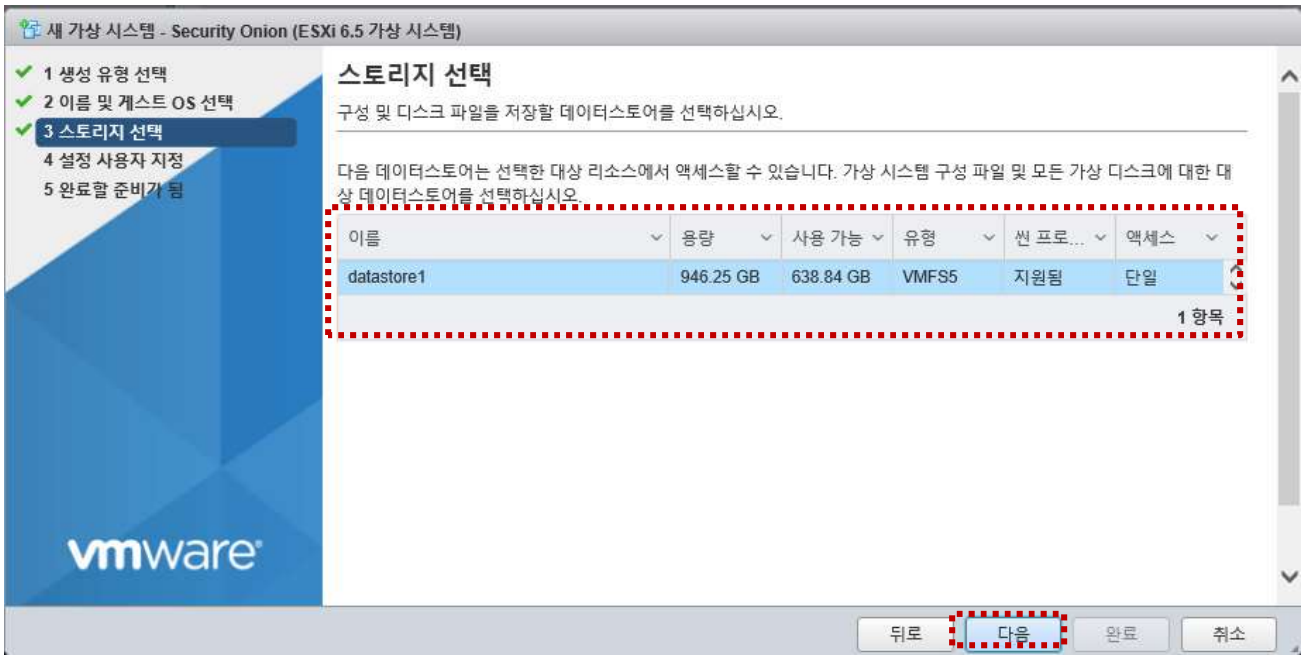
메모:

- ESXi 다운로드 주소: https://my.vmware.com/en/web/vmware/evalcenter?p=free-esxi6
- 디스크 이미지 굽기: Rufus 도구 사용 https://rufus.akeo.ie/
- Disk Imager https://sourceforge.net/projects/win32diskimager/files/latest/download
- USB 부팅 제가동은 전원 off/on (전원 케이블 포함)필요함
- https://github.com/Security-Onion-Solutions/security-onion/blob/master/Verify_ISO.md

8. vIDS

❖ Security Onion @ Hypervisor

① 스토리지 선택
② 다음



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- ESXi 다운로드 주소: https://my.vmware.com/en/web/vmware/evalcenter?p=free-esxi6
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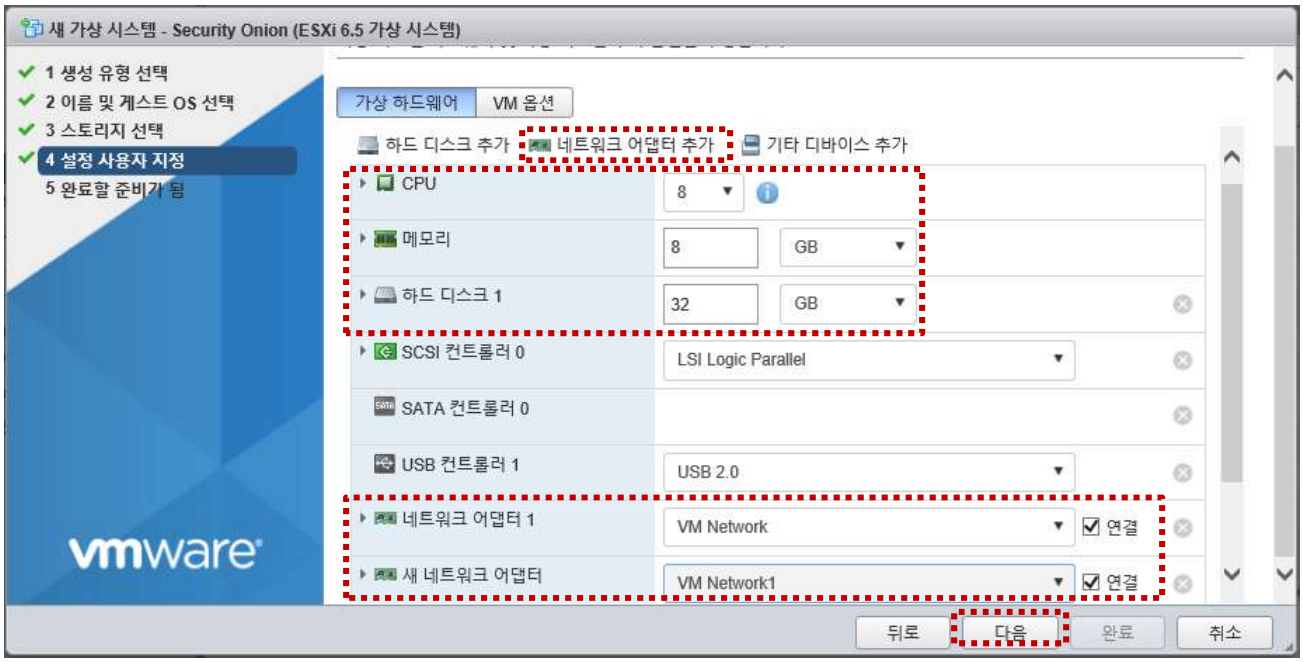
- https://github.com/Security-Onion-Solutions/security-onion/blob/master/Verify_ISO.md

8. vIDS

❖ Security Onion @ Hypervisor

① 네트워크 어댑터 추가
② CPU/메모리/하드디스크
③ 네트워크 어댑터 선택
④ 다음



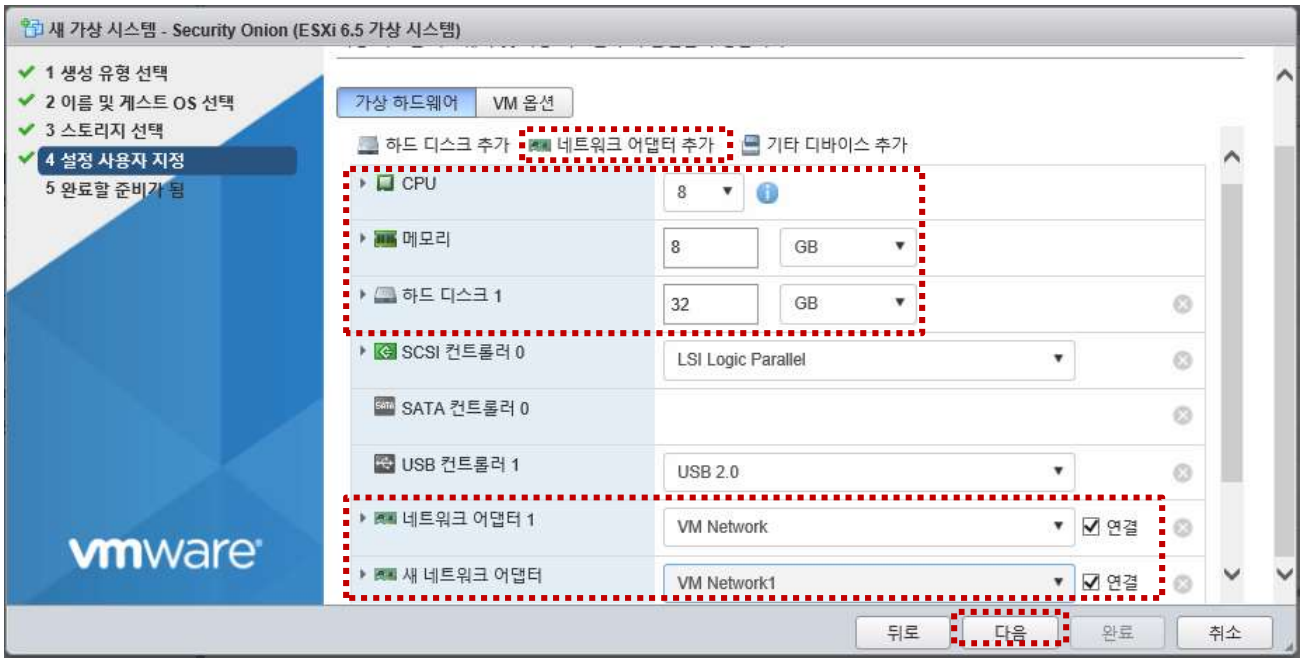
메모:

- 하드웨어 규격: https://github.com/Security-Onion-Solutions/security-onion/wiki/Hardware
- 최소 규격: RAM needed is 8GB
- https://github.com/Security-Onion-Solutions/security-onion/blob/master/Verify_ISO.md

8. vIDS

❖ Security Onion @ Hypervisor

① 네트워크 어댑터 추가
② CPU 8 Core / 메모리 8GB / 하드디스크 씬(Thin)
③ 네트워크 어댑터 선택
④ 다음



메모:

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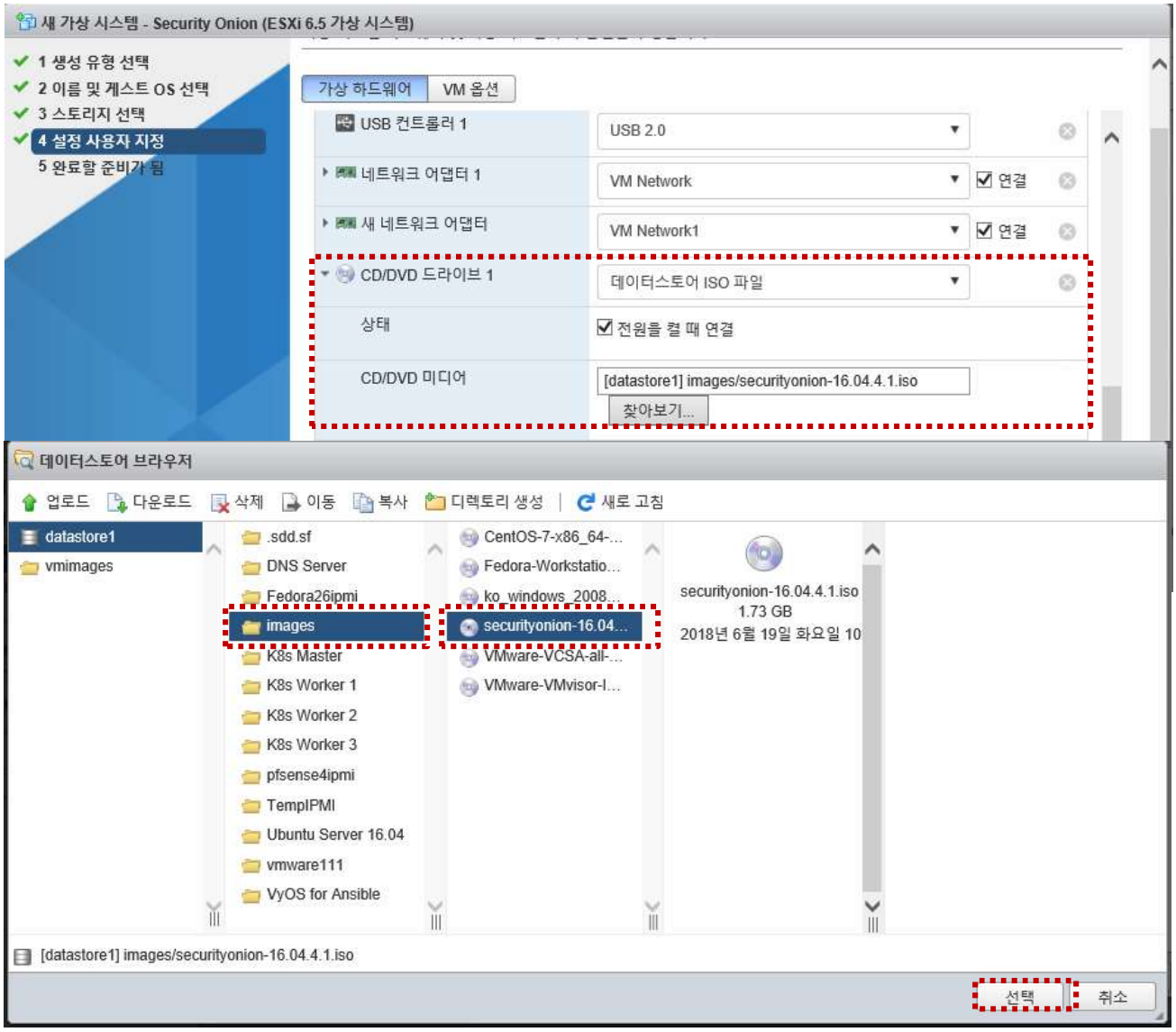
- https://github.com/Security-Onion-Solutions/security-onion/blob/master/Verify_ISO.md
- 스위치의 무작위 모드 확인 (미러링 효과)

8. vIDS

❖ Security Onion @ Hypervisor

① 설치 이미지 선택



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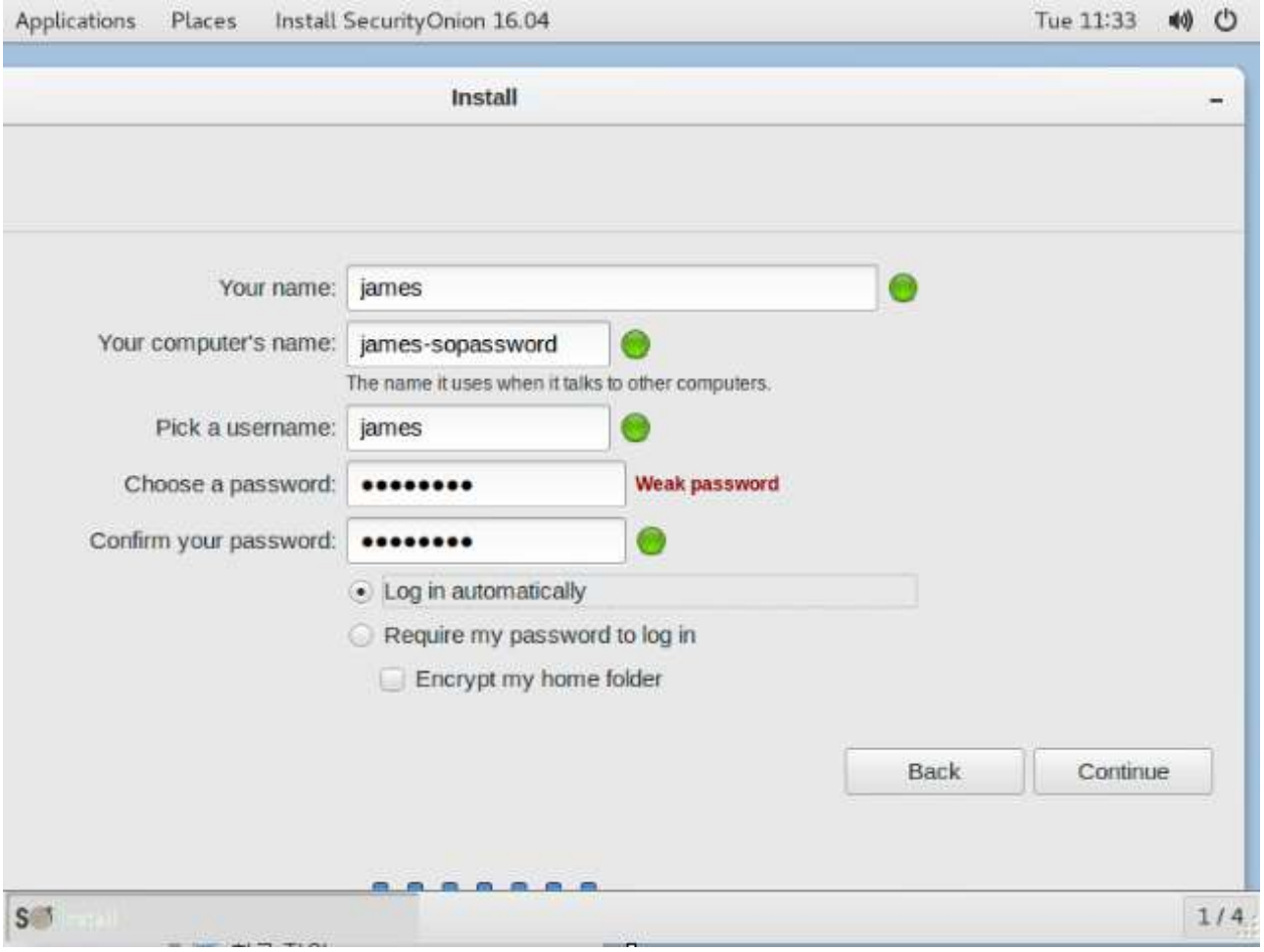
8. vIDS

❖ Security Onion @ Hypervisor



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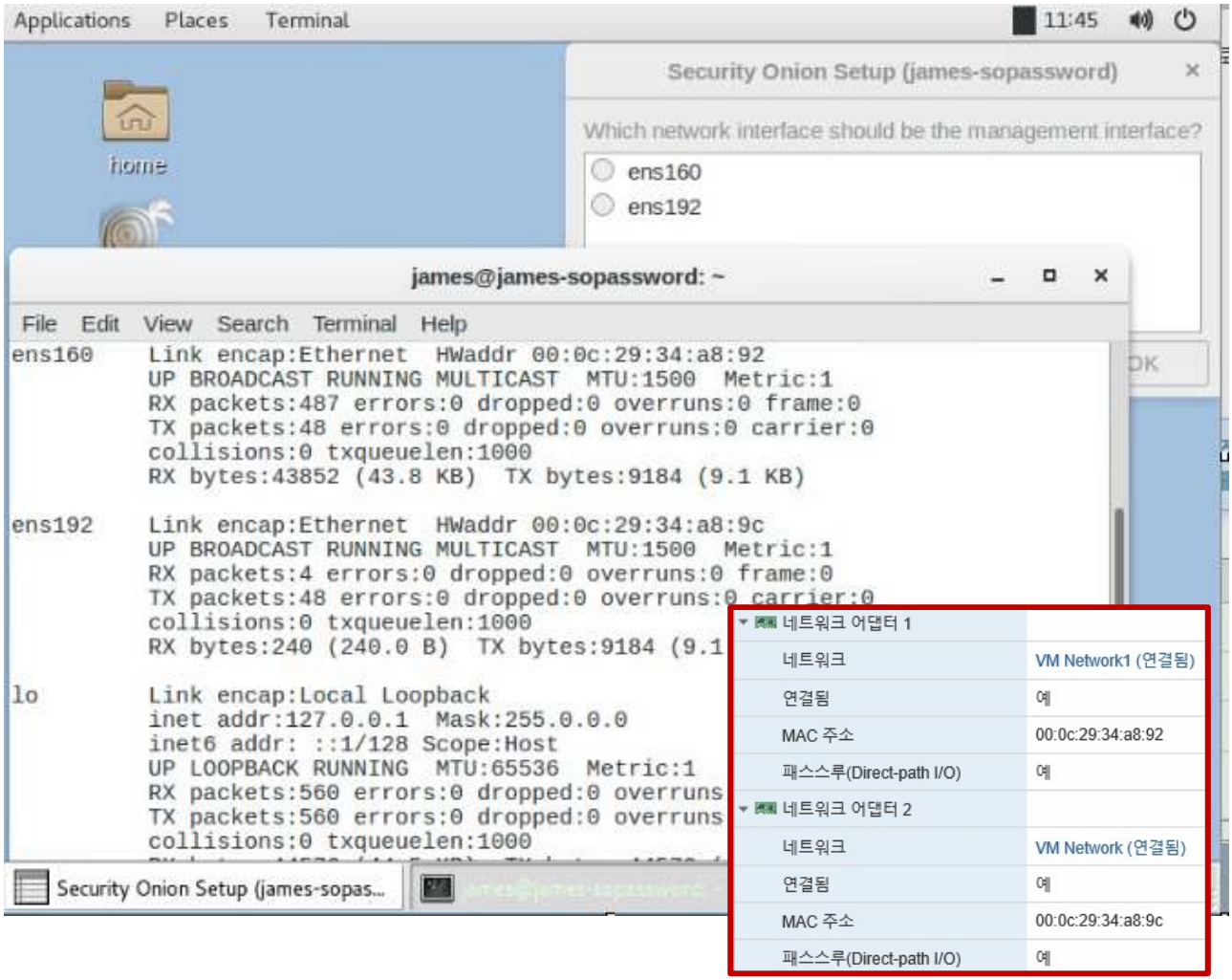
8. vIDS

❖ Security Onion @ Hypervisor

① 하이퍼바이저 확인
② 인터페이스 확인

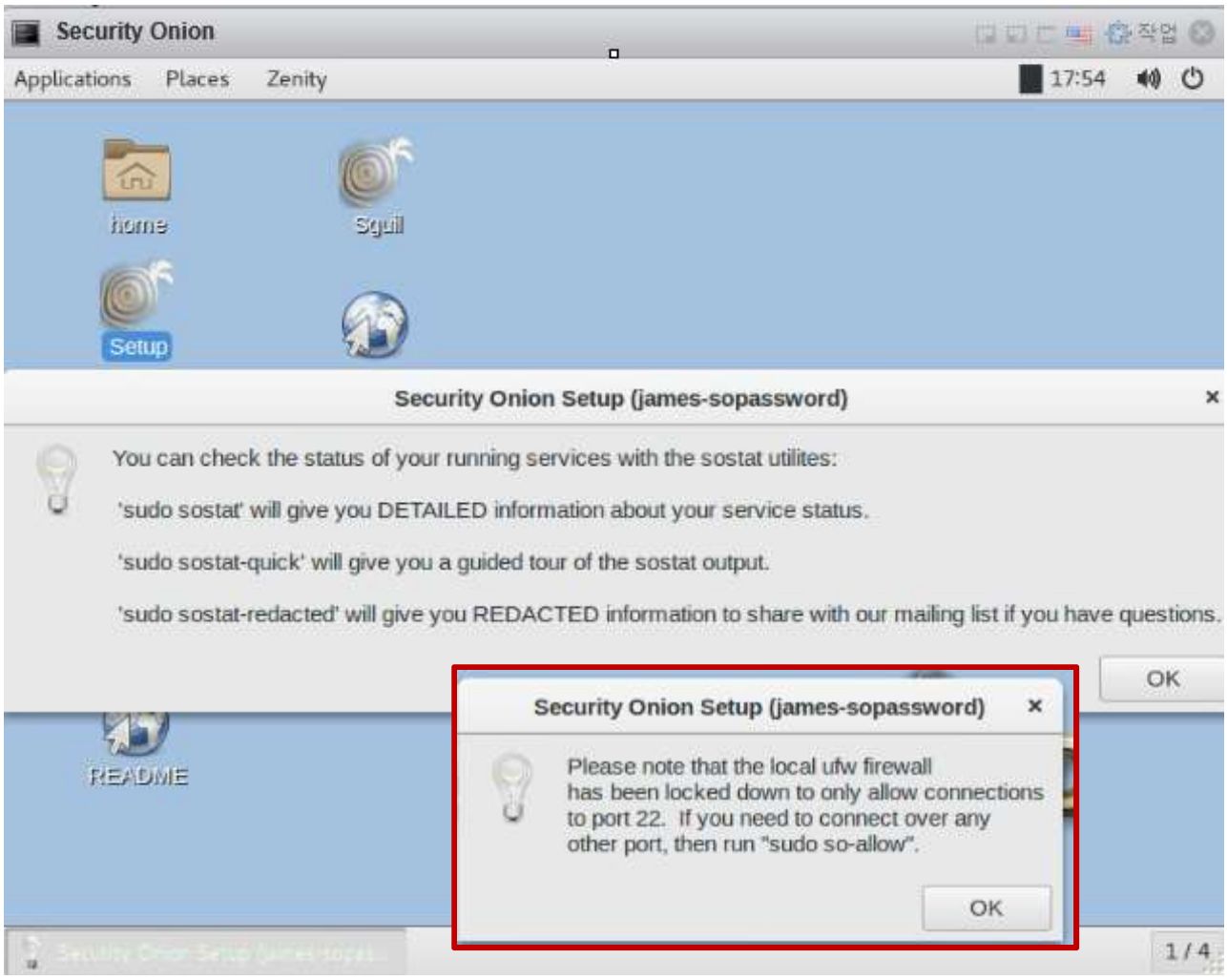


메모:

8. vIDS

❖ Security Onion @ Hypervisor

① 설치 이미지 선택
② **Restart**
③ **Setup**



메모:

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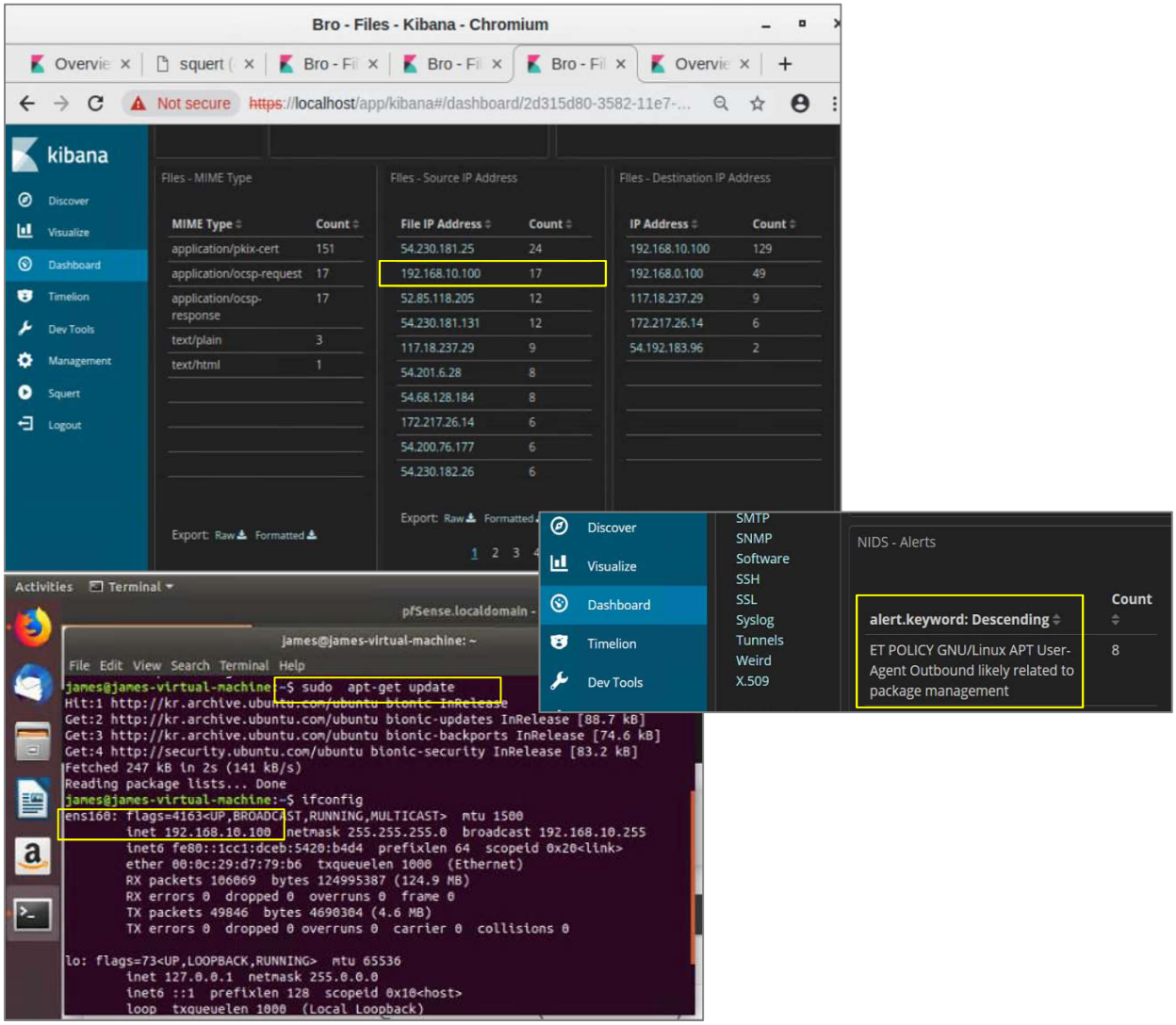
- 최소 규격: RAM needed is 8GB
- https://github.com/Security-Onion-Solutions/security-onion/blob/master/Verify_ISO.md

8. vIDS

❖ Security Onion @ Hypervisor

① **sudo apt get update @ Ubuntu Desktop**

② **Check event @ Security Onion**



메모:

❖ X-RDP for Security Onion (선택)

VM manager 사용하는 KVM/QEMU에서 마우스 인식 어려워 xrdp 설치

① **sudo ufw allow in 3389seconds**
② **sudo ufw allow ot 3389sword**
③ **sudo apt-get install xrdp**
④ **sudo apt-get install xfce4**
⑤ **sudo service xrdp restart**

⑥ **Remote Desktop 실행**

메모:

8. vIDS

❖ sudo so-allow for Remote Access

① sudo so-allow

② IP address for Remote Access

```
jslab@jslab-virtual-machine:~$ sudo so-allow
[sudo] password for jslab:
This program allows you to add a firewall rule to allow connections
from a new IP address.

What kind of device do you want to allow?

[a] - Analyst - ports 22/tcp, 443/tcp, and 7734/tcp
[b] - Logstash Beat - port 5044/tcp
[c] - apt-cacher-ng client - port 3142/tcp
[e] - Elasticsearch REST endpoint - port 9200
[f] - Logstash forwarder - standard - port 6050/tcp
[j] - Logstash forwarder - JSON - port 6051/tcp
[l] - Syslog device - port 514
[n] - Elasticsearch node-to-node communication - port 9300
[o] - OSSEC agent - port 1514
[s] - Security Onion sensor - 22/tcp, 4505/tcp, 4506/tcp, and

If you need to add any ports other than those listed above,
you can do so using the standard 'ufw' utility.

For more information, please see the Firewall page on our Wik
https://github.com/Security-Onion-Solutions/security-
onion/wiki/Firewall

Please enter your selection (a - analyst, c - apt-cacher-ng c
syslog, o - ossec, or s - Security Onion sensor, etc.):
a
Please enter the IP address of the analyst you'd like to allo
connect to port(s) 22,443,7734:
192.168.55.100
We're going to allow connections from 192.168.55.100 to port(s
22,443,7734.

Here's the firewall rule we're about to add:
sudo ufw allow proto tcp from 192.168.55.100 to any port 22,4
```

```
We're also whitelisting 192.168.55.100 in /var/ossec/etc/ossec.conf to
prevent OSSEC Active Response from blocking it.  Keep in mind, the OSSEC
server will be restarted once configuration is complete.

To continue and add this rule, press Enter.
Otherwise, press Ctrl-c to exit.

Rule added
Rule has been added.

Here is the entire firewall ruleset:

================================================================
UFW Rules
================================================================

To                         Action      From
--                         ------      ----
22/tcp                     ALLOW       Anywhere
22,443,7734/tcp            ALLOW       192.168.55.122
22,443,7734/tcp            ALLOW       192.168.10.100
22,443,7734/tcp            ALLOW       192.168.55.100
22/tcp (v6)                ALLOW       Anywhere (v6)


================================================================
Docker IPTables Rules
================================================================

To                 Action From
--                 ------ ----


Added whitelist entry for 192.168.55.100 in /var/ossec/etc/ossec.conf.

Restarting OSSEC Server...
jslab@jslab-virtual-machine:~$
```

메모:

8. vIDS

❖ Squert for Security Onion (선택)

1. **Squert is a web application that is used to query and view event data stored in a Sguil database (typically IDS alert data). Squert is a visual tool that attempts to provide additional context to events through the use of metadata, time series representations and weighted and logically grouped result sets.**
2. **Security Onion maintains its own fork of Squert**
3. **Squert authenticates against the Sguil user database, so you should be able to login to Squert using the same username/password you use to login to Sguil.**
4. **Data Type**
   - NIDS alerts
   - HIDS alerts
   - Asset data from PRADS (if PRADS and pads_agent are enabled)
   - HTTP logs from Bro (if http_agent is enabled)

메모:

- Squert: http://www.squertproject.org/
- Security Onion maintains its own fork of Squert: https://blog.securityonion.net/2016/09/squert-development.html

❖ sudo docker info

```
jslab@jslab-virtual-machine:~$ sudo docker info
Containers: 7
 Running: 7
 Paused: 0
 Stopped: 0
Images: 7
Server Version: 18.06.1-ce
Storage Driver: overlay2
 Backing Filesystem: extfs
 Supports d_type: true
 Native Overlay Diff: true
Logging Driver: json-file
Cgroup Driver: cgroupfs
Plugins:
 Volume: local
 Network: bridge host macvlan null overlay
 Log: awslogs fluentd gcplogs gelf journald json-file logentries splunk syslog
Swarm: inactive
Runtimes: runc
Default Runtime: runc
Init Binary: docker-init
containerd version: 468a545b9edcd5932818eb9de8e72413e616e86e
runc version: 69663f0bd4b60df09991c08812a60108003fa340
init version: fec3683
Security Options:
 apparmor
 seccomp
  Profile: default
Kernel Version: 4.15.0-36-generic
Operating System: Ubuntu 16.04.5 LTS
OSType: linux
Architecture: x86_64
CPUs: 8
Total Memory: 11.73GiB
Name: jslab-virtual-machine
ID: UDLG:YGGR:VHYI:DNNS:3GER:63BY:KNR4:AIN4:EYA2:F6GY:VOXU:SYWZ
Docker Root Dir: /var/lib/docker
Debug Mode (client): false
Debug Mode (server): false
Registry: https://index.docker.io/v1/
Labels:
Experimental: false
Insecure Registries:
 127.0.0.0/8
Live Restore Enabled: false

WARNING: No swap limit support
```

메모:

- sudo docker version

8. vIDS

❖ sudo docker info

① sudo iptables -t nat -L -n

② sudo docker ps

```
jslab@jslab-virtual-machine:~$ sudo docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
9872b6d8bc21        bridge              bridge              local
80a0d461c98d        host                host                local
8400d338e2a3        none                null                local
8d1ed97b634e        so-elastic-net      bridge              local
jslab@jslab-virtual-machine:~$
```

```
jslab@jslab-virtual-machine:~$ sudo docker ps
CONTAINER ID        IMAGE                                   COMMAND                  CREATED             STATUS
PORTS                                                                                NAMES
92fd22d9e34d        securityonionsolutions/so-curator       "/bin/bash"              11 hours ago        Up 11
hours                                                                                                        so-curator
93764999e697        securityonionsolutions/so-elastalert    "/opt/start-elastale…"   11 hours ago        Up 11
hours                                                                                                        so-elastalert
419f8db86c1e        securityonionsolutions/so-kibana        "/bin/sh -c /usr/loc…"   11 hours ago        Up 11
hours         127.0.0.1:5601->5601/tcp                                                                       so-kibana
35fde0562d89        securityonionsolutions/so-logstash      "/usr/local/bin/dock…"   11 hours ago        Up 11
hours         0.0.0.0:5044->5044/tcp, 0.0.0.0:6050-6053->6050-6053/tcp, 0.0.0.0:9600->9600/tcp   so-logstash
a541ecde19ef        securityonionsolutions/so-elasticsearch "/bin/bash bin/es-do…"   11 hours ago        Up 11
hours         127.0.0.1:9200->9200/tcp, 127.0.0.1:9300->9300/tcp                                             so-elasticsearch
c4fd232d54dc        securityonionsolutions/so-domainstats   "/bin/sh -c '/usr/bi…"   11 hours ago        Up 11
hours         20000/tcp                                                                                      so-domainstats
27e1571a4038        securityonionsolutions/so-freqserver    "/bin/sh -c '/usr/bi…"   11 hours ago        Up 11
hours         10004/tcp                                                                                      so-freqserver
jslab@jslab-virtual-machine:~$
```

메모:

8. vIDS

❖ sudo iptables -t nat -L -n

```
jslab@jslab-virtual-machine:~$ sudo iptables -t nat -L -n
Chain PREROUTING (policy ACCEPT)
target     prot opt source               destination
DOCKER     all  --  0.0.0.0/0            0.0.0.0/0            ADDRTYPE match dst-type LOCAL

Chain INPUT (policy ACCEPT)
target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
DOCKER     all  --  0.0.0.0/0           !127.0.0.0/8          ADDRTYPE match dst-type LOCAL

Chain POSTROUTING (policy ACCEPT)
target     prot opt source               destination
MASQUERADE  all  --  172.18.0.0/16        0.0.0.0/0
MASQUERADE  all  --  172.17.0.0/16        0.0.0.0/0
MASQUERADE  tcp  --  172.17.0.4           172.17.0.4           tcp dpt:9300
MASQUERADE  tcp  --  172.17.0.4           172.17.0.4           tcp dpt:9200
MASQUERADE  tcp  --  172.17.0.5           172.17.0.5           tcp dpt:9600
MASQUERADE  tcp  --  172.17.0.5           172.17.0.5           tcp dpt:6053
MASQUERADE  tcp  --  172.17.0.5           172.17.0.5           tcp dpt:6052
MASQUERADE  tcp  --  172.17.0.5           172.17.0.5           tcp dpt:6051
MASQUERADE  tcp  --  172.17.0.5           172.17.0.5           tcp dpt:6050
MASQUERADE  tcp  --  172.17.0.5           172.17.0.5           tcp dpt:5044
MASQUERADE  tcp  --  172.17.0.6           172.17.0.6           tcp dpt:5601

Chain DOCKER (2 references)
target     prot opt source               destination
RETURN     all  --  0.0.0.0/0            0.0.0.0/0
RETURN     all  --  0.0.0.0/0            0.0.0.0/0
DNAT       tcp  --  0.0.0.0/0            127.0.0.1            tcp dpt:9300 to:172.17.0.4:9300
DNAT       tcp  --  0.0.0.0/0            127.0.0.1            tcp dpt:9200 to:172.17.0.4:9200
DNAT       tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:9600 to:172.17.0.5:9600
DNAT       tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:6053 to:172.17.0.5:6053
DNAT       tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:6052 to:172.17.0.5:6052
DNAT       tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:6051 to:172.17.0.5:6051
DNAT       tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:6050 to:172.17.0.5:6050
DNAT       tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:5044 to:172.17.0.5:5044
DNAT       tcp  --  0.0.0.0/0            127.0.0.1            tcp dpt:5601 to:172.17.0.6:5601
jslab@jslab-virtual-machine:~$
```

메모:

8. vIDS

❖ sudo iptables -L -n

```
jslab@jslab-virtual-machine:~$ sudo iptables -L -n
Chain INPUT (policy DROP)
target     prot opt source               destination
ufw-before-logging-input  all  --  0.0.0.0/0            0.0.0.0/0
ufw-before-input  all  --  0.0.0.0/0            0.0.0.0/0
ufw-after-input  all  --  0.0.0.0/0            0.0.0.0/0
ufw-after-logging-input  all  --  0.0.0.0/0            0.0.0.0/0
ufw-reject-input  all  --  0.0.0.0/0            0.0.0.0/0
ufw-track-input  all  --  0.0.0.0/0            0.0.0.0/0

Chain FORWARD (policy DROP)
target     prot opt source               destination
DOCKER-USER  all  --  0.0.0.0/0            0.0.0.0/0
DOCKER-ISOLATION-STAGE-1  all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0            ctstate RELATED,ESTABLISHED
DOCKER     all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0            ctstate RELATED,ESTABLISHED
DOCKER     all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0
ufw-before-logging-forward  all  --  0.0.0.0/0            0.0.0.0/0
ufw-before-forward  all  --  0.0.0.0/0            0.0.0.0/0
ufw-after-forward  all  --  0.0.0.0/0            0.0.0.0/0
ufw-after-logging-forward  all  --  0.0.0.0/0            0.0.0.0/0
ufw-reject-forward  all  --  0.0.0.0/0            0.0.0.0/0
ufw-track-forward  all  --  0.0.0.0/0            0.0.0.0/0

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
ufw-before-logging-output  all  --  0.0.0.0/0            0.0.0.0/0
ufw-before-output  all  --  0.0.0.0/0            0.0.0.0/0
ufw-after-output  all  --  0.0.0.0/0            0.0.0.0/0
ufw-after-logging-output  all  --  0.0.0.0/0            0.0.0.0/0
ufw-reject-output  all  --  0.0.0.0/0            0.0.0.0/0
ufw-track-output  all  --  0.0.0.0/0            0.0.0.0/0

Chain DOCKER (2 references)
target     prot opt source               destination
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.4           tcp dpt:9300
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.4           tcp dpt:9200
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.5           tcp dpt:9600
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.5           tcp dpt:6053
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.5           tcp dpt:6052
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.5           tcp dpt:6051
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.5           tcp dpt:6050
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.5           tcp dpt:5044
ACCEPT     tcp  --  0.0.0.0/0            172.17.0.6           tcp dpt:5601

Chain DOCKER-ISOLATION-STAGE-1 (1 references)
target     prot opt source               destination
DOCKER-ISOLATION-STAGE-2  all  --  0.0.0.0/0            0.0.0.0/0
DOCKER-ISOLATION-STAGE-2  all  --  0.0.0.0/0            0.0.0.0/0
RETURN     all  --  0.0.0.0/0            0.0.0.0/0

Chain DOCKER-ISOLATION-STAGE-2 (2 references)
target     prot opt source               destination
DROP       all  --  0.0.0.0/0            0.0.0.0/0
DROP       all  --  0.0.0.0/0            0.0.0.0/0
RETURN     all  --  0.0.0.0/0            0.0.0.0/0

Chain DOCKER-USER (1 references)
target     prot opt source               destination
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0            state RELATED,ESTABLISHED
DROP       all  --  0.0.0.0/0            0.0.0.0/0
RETURN     all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-after-forward (1 references)
target     prot opt source               destination

Chain ufw-after-input (1 references)
target     prot opt source               destination
ufw-skip-to-policy-input  udp  --  0.0.0.0/0            0.0.0.0/0            udp dpt:137
ufw-skip-to-policy-input  udp  --  0.0.0.0/0            0.0.0.0/0            udp dpt:138
ufw-skip-to-policy-input  tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:139
ufw-skip-to-policy-input  tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:445
ufw-skip-to-policy-input  udp  --  0.0.0.0/0            0.0.0.0/0            udp dpt:67
ufw-skip-to-policy-input  udp  --  0.0.0.0/0            0.0.0.0/0            udp dpt:68
ufw-skip-to-policy-input  all  --  0.0.0.0/0            0.0.0.0/0            ADDRTYPE match dst-type BROADCAST

Chain ufw-after-logging-forward (1 references)
target     prot opt source               destination
LOG        all  --  0.0.0.0/0            0.0.0.0/0            limit: avg 3/min burst 10 LOG flags 0 level 4 prefix "[UFW BLOCK] "

Chain ufw-after-logging-input (1 references)
target     prot opt source               destination
LOG        all  --  0.0.0.0/0            0.0.0.0/0            limit: avg 3/min burst 10 LOG flags 0 level 4 prefix "[UFW BLOCK] "

Chain ufw-after-logging-output (1 references)
target     prot opt source               destination

Chain ufw-after-output (1 references)
target     prot opt source               destination

Chain ufw-before-forward (1 references)
target     prot opt source               destination
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0            ctstate RELATED,ESTABLISHED
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 3
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 4
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 11
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 12
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 8
ufw-user-forward  all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-before-input (1 references)
target     prot opt source               destination
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0            ctstate RELATED,ESTABLISHED
```

```
ufw-logging-deny  all  --  0.0.0.0/0            0.0.0.0/0            ctstate INVALID
DROP       all  --  0.0.0.0/0            0.0.0.0/0            ctstate INVALID
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 3
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 4
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 11
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 12
ACCEPT     icmp --  0.0.0.0/0            0.0.0.0/0            icmptype 8
ACCEPT     udp  --  0.0.0.0/0            0.0.0.0/0            udp spt:67 dpt:68
ufw-not-local  all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     udp  --  0.0.0.0/0            224.0.0.251          udp dpt:5353
ACCEPT     udp  --  0.0.0.0/0            239.255.255.250      udp dpt:1900
ufw-user-input  all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-before-logging-forward (1 references)
target     prot opt source               destination

Chain ufw-before-logging-input (1 references)
target     prot opt source               destination

Chain ufw-before-logging-output (1 references)
target     prot opt source               destination

Chain ufw-before-output (1 references)
target     prot opt source               destination
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0            ctstate RELATED,ESTABLISHED
ufw-user-output  all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-logging-allow (0 references)
target     prot opt source               destination
LOG        all  --  0.0.0.0/0            0.0.0.0/0            limit: avg 3/min burst 10 LOG flags 0 level 4 prefix "[UFW ALLOW] "

Chain ufw-logging-deny (2 references)
target     prot opt source               destination
RETURN     all  --  0.0.0.0/0            0.0.0.0/0            ctstate INVALID limit: avg 3/min burst 10
LOG        all  --  0.0.0.0/0            0.0.0.0/0            limit: avg 3/min burst 10 LOG flags 0 level 4 prefix "[UFW BLOCK] "

Chain ufw-not-local (1 references)
target     prot opt source               destination
RETURN     all  --  0.0.0.0/0            0.0.0.0/0            ADDRTYPE match dst-type LOCAL
RETURN     all  --  0.0.0.0/0            0.0.0.0/0            ADDRTYPE match dst-type MULTICAST
RETURN     all  --  0.0.0.0/0            0.0.0.0/0            ADDRTYPE match dst-type BROADCAST
ufw-logging-deny  all  --  0.0.0.0/0            0.0.0.0/0            limit: avg 3/min burst 10
DROP       all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-reject-forward (1 references)
target     prot opt source               destination

Chain ufw-reject-input (1 references)
target     prot opt source               destination

Chain ufw-reject-output (1 references)
target     prot opt source               destination

Chain ufw-skip-to-policy-forward (0 references)
target     prot opt source               destination
DROP       all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-skip-to-policy-input (7 references)
target     prot opt source               destination
DROP       all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-skip-to-policy-output (0 references)
target     prot opt source               destination
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-track-forward (1 references)
target     prot opt source               destination

Chain ufw-track-input (1 references)
target     prot opt source               destination

Chain ufw-track-output (1 references)
target     prot opt source               destination
ACCEPT     tcp  --  0.0.0.0/0            0.0.0.0/0            ctstate NEW
ACCEPT     udp  --  0.0.0.0/0            0.0.0.0/0            ctstate NEW

Chain ufw-user-forward (1 references)
target     prot opt source               destination

Chain ufw-user-input (1 references)
target     prot opt source               destination
ACCEPT     tcp  --  0.0.0.0/0            0.0.0.0/0            tcp dpt:22
ACCEPT     tcp  --  192.168.55.122       0.0.0.0/0            multiport dports 22,443,7734
ACCEPT     tcp  --  192.168.10.100       0.0.0.0/0            multiport dports 22,443,7734
ACCEPT     tcp  --  192.168.55.100       0.0.0.0/0            multiport dports 22,443,7734

Chain ufw-user-limit (0 references)
target     prot opt source               destination
LOG        all  --  0.0.0.0/0            0.0.0.0/0            limit: avg 3/min burst 5 LOG flags 0 level 4 prefix "[UFW LIMIT BLOCK] "
REJECT     all  --  0.0.0.0/0            0.0.0.0/0            reject-with icmp-port-unreachable

Chain ufw-user-limit-accept (0 references)
target     prot opt source               destination
ACCEPT     all  --  0.0.0.0/0            0.0.0.0/0

Chain ufw-user-logging-forward (0 references)
target     prot opt source               destination

Chain ufw-user-logging-input (0 references)
target     prot opt source               destination

Chain ufw-user-logging-output (0 references)
target     prot opt source               destination

Chain ufw-user-output (1 references)
target     prot opt source               destination
jslab@jslab-virtual-machine:~$
```

메모:

8. vIDS

❖ ip route

① **ip route**

② **brctl show**

③ **Check 'sudo docker network ls'** # 도커의 리눅스 브릿지 사용

```
jslab@jslab-virtual-machine:~$ ip route
default via 192.168.55.1 dev ens224 onlink
172.17.0.0/16 dev docker0  proto kernel  scope link  src 172.17.0.1
172.18.0.0/16 dev br-8d1ed97b634e  proto kernel  scope link  src 172.18.0.1
192.168.55.0/24 dev ens224  proto kernel  scope link  src 192.168.55.43
jslab@jslab-virtual-machine:~$v
```

```
jslab@jslab-virtual-machine:~$ brctl show
bridge name     bridge id               STP enabled     interfaces
br-8d1ed97b634e 8000.02429b7f90e0       no              veth0a8d905
                                                        veth2fc6972
                                                        veth3b98e4f
                                                        veth5284a6f
                                                        veth783c90b
                                                        veth7a5200b
                                                        vethcdb21af
docker0         8000.0242d38891bc       no              veth4021b3b
                                                        veth591b8ce
                                                        veth7ef17b0
                                                        veth8d500af
                                                        vetha1d41ca
                                                        vethbc57b2b
                                                        vethebda422
```

```
jslab@jslab-virtual-machine:~$ sudo docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
9872b6d8bc21        bridge              bridge              local
80a0d461c98d        host                host                local
8400d338e2a3        none                null                local
8d1ed97b634e        so-elastic-net      bridge              local
jslab@jslab-virtual-machine:~$
```

메모:

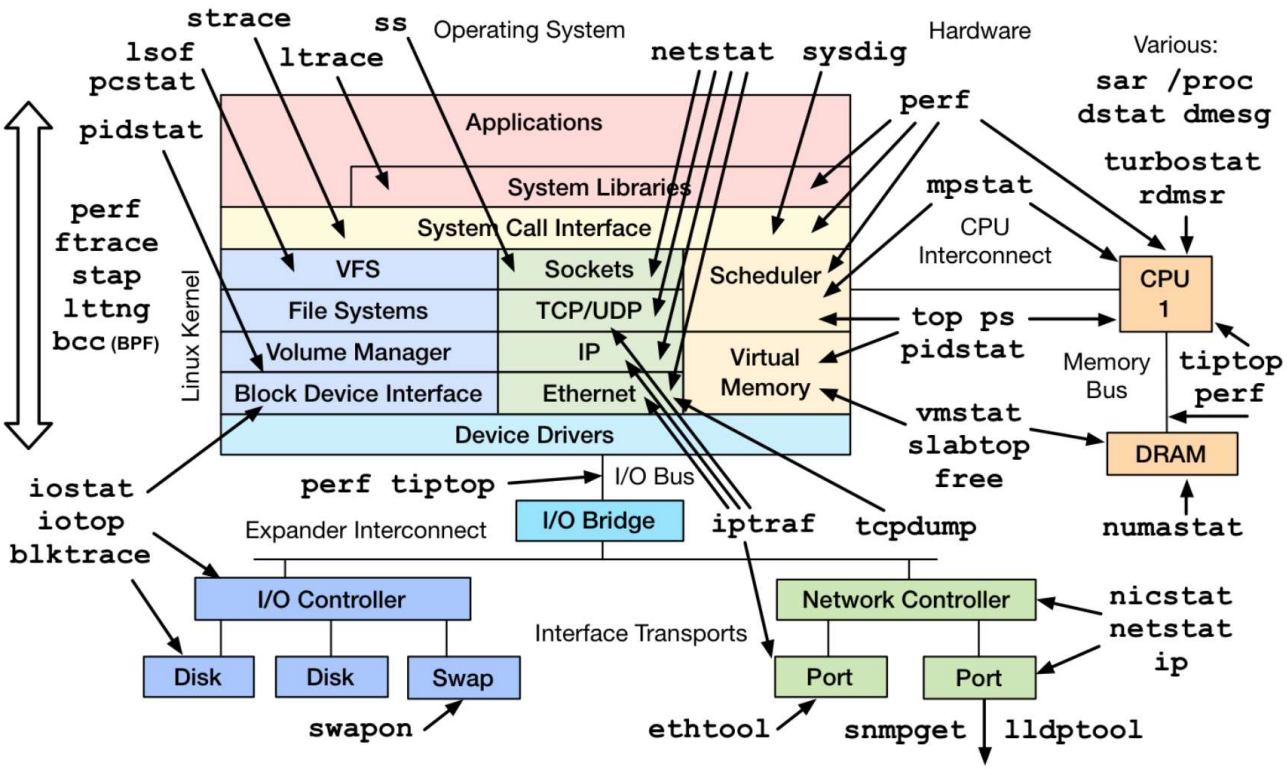
8. vIDS

❖ Linux Perf Tools

① **sudo apt-get install nmh**

② **Fedora:** 다음쪽 참조

- bash <(curl -Ss https://my-netdata.io/kickstart.sh)



메모:

- 컨테이너 고려사항
  - ✓ Netdata 등의 트래픽 변동 확인http://127.0.0.1:19999/
  - ✓ Host PID는 컨테이너 ID와 연동하지 않음
  - ✓ 커널에 컨테이너 ID 표시 없음
  - ✓ 리눅스 도구에 컨테이너를 위한 설명 없음 (netdata는 docker0 트래픽 통계 확인 가능)

8. vIDS

❖ sudo docker network ls & brctl show

1. **sudo docker network ls**
2. **'brctl show' & 'virsh net-list --all'**

```
jslab@jslab-virtual-machine:~$ ip route
default via 192.168.55.1 dev ens224 onlink
172.17.0.0/16 dev docker0  proto kernel  scope link  src 172.17.0.1
172.18.0.0/16 dev br-8d1ed97b634e  proto kernel  scope link  src 172.18.0.1
192.168.55.0/24 dev ens224  proto kernel  scope link  src 192.168.55.43
jslab@jslab-virtual-machine:~$v
```

```
jslab@jslab-virtual-machine:~$ brctl show
bridge name     bridge id               STP enabled     interfaces
br-8d1ed97b634e 8000.02429b7f90e0       no              veth0a8d905
                                                        veth2fc6972
                                                        veth3b98e4f
                                                        veth5284a6f
                                                        veth783c90b
                                                        veth7a5200b
                                                        vethcdb21af
docker0         8000.0242d38891bc       no              veth4021b3b
                                                        veth591b8ce
                                                        veth7ef17b0
                                                        veth8d500af
                                                        vetha1d41ca
                                                        vethbc57b2b
                                                        vethebda422
```

```
jslab@jslab-virtual-machine:~$ sudo virsh net-list --all
 Name                 State      Autostart     Persistent
----------------------------------------------------------
 default              active     yes           yes

jslab@jslab-virtual-machine:~$
```

메모:

- virsh is a command line interface tool for managing guests and the hypervisor

❖ brctl showmacs docker0

① brctl showmacs docker0

```
jslab@jslab-virtual-machine:~$ brctl showmacs docker0
port no mac addr                is local?       ageing timer
  4     02:42:ac:11:00:05       no                 0.90
  5     02:42:ac:11:00:06       no                16.37
  6     06:e9:55:0d:c7:4a       yes                0.00
  6     06:e9:55:0d:c7:4a       yes                0.00
  1     42:2c:60:88:9a:65       yes                0.00
  1     42:2c:60:88:9a:65       yes                0.00
  3     4e:b4:78:52:47:4b       yes                0.00
  3     4e:b4:78:52:47:4b       yes                0.00
  2     7a:02:82:10:c9:70       yes                0.00
  2     7a:02:82:10:c9:70       yes                0.00
  4     82:f5:84:ad:6b:f5       yes                0.00
  4     82:f5:84:ad:6b:f5       yes                0.00
  7     a6:f3:3a:e2:05:6f       yes                0.00
  7     a6:f3:3a:e2:05:6f       yes                0.00
  5     e2:d3:a5:2f:33:52       yes                0.00
  5     e2:d3:a5:2f:33:52       yes                0.00
jslab@jslab-virtual-machine:~$
```

메모:

- Network : bridge(bridge), host(host), none(null), so-elastic-net(bridge)

8. vIDS

❖ sudo docker network inspect bridge

```
jslab@jslab-virtual-machine:~$ sudo docker network inspect bridge
[sudo] password for jslab:
[
    {
        "Name": "bridge",
        "Id": "9872b6d8bc21ff54e2d204efd323ba6bef8791f497598c15d115bbe1cb477826",
        "Created": "2018-11-18T19:35:19.141183196Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "172.17.0.0/16",
                    "Gateway": "172.17.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "27e1571a40380bbc40c2db9161e65b666cac2e48b1c01020799a563c7c767163": {
                "Name": "so-freqserver",
                "EndpointID": "93d76dc8ad119431f94e1c179586a6d1495e7db487a1fd3bf7e43064
                "MacAddress": "02:42:ac:11:00:02",
                "IPv4Address": "172.17.0.2/16",
                "IPv6Address": ""
            },
            "35fde0562d899b0d6cd0e7ac820dfd73a60bde230c170210f35cea7c255b5131": {
                "Name": "so-logstash",
                "EndpointID": "c7678ac47cbb18705e788c3e0652ef7749451a01e7db96c21d66484f
                "MacAddress": "02:42:ac:11:00:05",
                "IPv4Address": "172.17.0.5/16",
                "IPv6Address": ""
            },
            "419f8db86c1ed5fccc28d0a41fb4f059c54dcbf038c3d7056e59956bfa3c0a3c": {
                "Name": "so-kibana",
                "EndpointID": "79bb394b8a8538a1f409e0f4e59ab442c26ab77b5173ce00d172cbf0
                "MacAddress": "02:42:ac:11:00:06",
                "IPv4Address": "172.17.0.6/16",
                "IPv6Address": ""
            },
            "92fd22d9e34dddc90af681aae94dd9e6d6ad208b4df87eb3e549d83064a5371d": {
                "Name": "so-curator",
                "EndpointID": "6b8bc81f87fc1f44a7f5e8e0a87309e7fa5a16e0295ff78f73935801
                "MacAddress": "02:42:ac:11:00:08",
                "IPv4Address": "172.17.0.8/16",
                "IPv6Address": ""
            },
            "93764999e6975359edeb3a03ca8908b5358b640cbbc21b5793b57463bdfbf7c0": {
                "Name": "so-elastalert",
                "EndpointID": "8469cb9216c93abc9f4cc790511bce46870eda81785a2250f2bd06c3
                "MacAddress": "02:42:ac:11:00:07",
                "IPv4Address": "172.17.0.7/16",
                "IPv6Address": ""
            },
            "a541ecde19ef87b73595305e0958d7208458d745eb66ac5ee66d07d084d8e0b6": {
                "Name": "so-elasticsearch",
                "EndpointID": "e0dc9a32ad25a1f66e73fc5bfb608e7d634ded6a5aad60ae135e99cc
                "MacAddress": "02:42:ac:11:00:04",
                "IPv4Address": "172.17.0.4/16",
                "IPv6Address": ""
            },
            "c4fd232d54dc571b105c5909742dda1f32635e65bbc85c065ddef536d104dfd6": {
                "Name": "so-domainstats",
                "EndpointID": "cd0e6530e299debdb3ee1a15860438298d942c1200634e2d16b1ef46
                "MacAddress": "02:42:ac:11:00:03",
                "IPv4Address": "172.17.0.3/16",
                "IPv6Address": ""
            }
        },
        "Options": {
            "com.docker.network.bridge.default_bridge": "true",
            "com.docker.network.bridge.enable_icc": "true",
            "com.docker.network.bridge.enable_ip_masquerade": "true",
            "com.docker.network.bridge.host_binding_ipv4": "0.0.0.0",
            "com.docker.network.bridge.name": "docker0",
            "com.docker.network.driver.mtu": "1500"
        },
        "Labels": {}
    }
]
```


```
"Containers": {
        "27e1571a40380bbc40c2db9161e65b666cac2e48b1c01020799a563c7c767163": {
            "Name": "so-freqserver",
            "EndpointID": "93d76dc8ad119431f94e1c179586a6d1495e7db487a1fd3bf7e4306421f15555",
            "MacAddress": "02:42:ac:11:00:02",
            "IPv4Address": "172.17.0.2/16",
            "IPv6Address": ""
        },
        "35fde0562d899b0d6cd0e7ac820dfd73a60bde230c170210f35cea7c255b5131": {
            "Name": "so-logstash",
            "EndpointID": "c7678ac47cbb18705e788c3e0652ef7749451a01e7db96c21d66484f1217bea3",
            "MacAddress": "02:42:ac:11:00:05",
            "IPv4Address": "172.17.0.5/16",
            "IPv6Address": ""
        },
        "419f8db86c1ed5fccc28d0a41fb4f059c54dcbf038c3d7056e59956bfa3c0a3c": {
            "Name": "so-kibana",
            "EndpointID": "79bb394b8a8538a1f409e0f4e59ab442c26ab77b5173ce00d172cbf0c98d8f35",
            "MacAddress": "02:42:ac:11:00:06",
            "IPv4Address": "172.17.0.6/16",
            "IPv6Address": ""
        },
        "92fd22d9e34dddc90af681aae94dd9e6d6ad208b4df87eb3e549d83064a5371d": {
            "Name": "so-curator",
            "EndpointID": "6b8bc81f87fc1f44a7f5e8e0a87309e7fa5a16e0295ff78f73935801ab17454a",
            "MacAddress": "02:42:ac:11:00:08",
            "IPv4Address": "172.17.0.8/16",
            "IPv6Address": ""
        },
        "93764999e6975359edeb3a03ca8908b5358b640cbbc21b5793b57463bdfbf7c0": {
            "Name": "so-elastalert",
            "EndpointID": "8469cb9216c93abc9f4cc790511bce46870eda81785a2250f2bd06c3c9d67f7a",
            "MacAddress": "02:42:ac:11:00:07",
            "IPv4Address": "172.17.0.7/16",
            "IPv6Address": ""
        },
        "a541ecde19ef87b73595305e0958d7208458d745eb66ac5ee66d07d084d8e0b6": {
            "Name": "so-elasticsearch",
            "EndpointID": "e0dc9a32ad25a1f66e73fc5bfb608e7d634ded6a5aad60ae135e99ccd505a58d",
            "MacAddress": "02:42:ac:11:00:04",
            "IPv4Address": "172.17.0.4/16",
            "IPv6Address": ""
        },
        "c4fd232d54dc571b105c5909742dda1f32635e65bbc85c065ddef536d104dfd6": {
            "Name": "so-domainstats",
            "EndpointID": "cd0e6530e299debdb3ee1a15860438298d942c1200634e2d16b1ef46ba1ca1f4",
            "MacAddress": "02:42:ac:11:00:03",
            "IPv4Address": "172.17.0.3/16",
            "IPv6Address": ""
        }
    },
```


메모:

- Containers @ Bridge : so-curator(172.17.0.8/16), so-elastalert(172.17.0.7/16), so-kibana(172.17.0.6/16), so-logstash(172.17.0.5/16), so-elasticsearch(172.17.0.4/16), so-domainstats(172.17.0.3/16), so-freqserver (172.17.0.2/16)

8. vIDS

❖ sudo docker network inspect so-elastic-net

```
jslab@jslab-virtual-machine:~$ sudo docker network inspect so-elastic-net
[
    {
        "Name": "so-elastic-net",
        "Id": "8d1ed97b634e480e725e4033bfde3c2e382765bb5f1274dfaef7533281c0070a",
        "Created": "2018-11-18T19:38:51.794605818Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "172.18.0.0/16",
                    "Gateway": "172.18.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "27e1571a40380bbc40c2db9161e65b666cac2e48b1c01020799a563c7c767163": {
                "Name": "so-freqserver",
                "EndpointID": "5443b5e27f18c283aac673a5158c680f1cd16ab7473b96d43ac2
                "MacAddress": "02:42:ac:12:00:02",
                "IPv4Address": "172.18.0.2/16",
                "IPv6Address": ""
            },
            "35fde0562d899b0d6cd0e7ac820dfd73a60bde230c170210f35cea7c255b5131": {
                "Name": "so-logstash",
                "EndpointID": "f0dfcc32661fc7fb04e8f5a08f24cbe4d1545f6b82b56375990a
                "MacAddress": "02:42:ac:12:00:05",
                "IPv4Address": "172.18.0.5/16",
                "IPv6Address": ""
            },
            "419f8db86c1ed5fccc28d0a41fb4f059c54dcbf038c3d7056e59956bfa3c0a3c": {
                "Name": "so-kibana",
                "EndpointID": "1af0dd03cc5aadd4ea15f55758e752b1ae45b2fd9f8f647c43c6
                "MacAddress": "02:42:ac:12:00:06",
                "IPv4Address": "172.18.0.6/16",
                "IPv6Address": ""
            },
            "92fd22d9e34dddc90af681aae94dd9e6d6ad208b4df87eb3e549d83064a5371d": {
                "Name": "so-curator",
                "EndpointID": "ed12e89b81146df9beeb46156d778a2554fa8f0bedc43be7956f
                "MacAddress": "02:42:ac:12:00:08",
                "IPv4Address": "172.18.0.8/16",
                "IPv6Address": ""
            },
            "93764999e6975359edeb3a03ca8908b5358b640cbbc21b5793b57463bdfbf7c0": {
                "Name": "so-elastalert",
                "EndpointID": "3d308fafa699188adce990fdd9b4d13aa30bc38595e19b93b3fa
                "MacAddress": "02:42:ac:12:00:07",
                "IPv4Address": "172.18.0.7/16",
                "IPv6Address": ""
            },
            "a541ecde19ef87b73595305e0958d7208458d745eb66ac5ee66d07d084d8e0b6": {
                "Name": "so-elasticsearch",
                "EndpointID": "ed4125e7734b9c3f46adc328fa8edc61c72f18ec644b60570859
                "MacAddress": "02:42:ac:12:00:04",
                "IPv4Address": "172.18.0.4/16",
                "IPv6Address": ""
            },
            "c4fd232d54dc571b105c5909742dda1f32635e65bbc85c065ddef536d104dfd6": {
                "Name": "so-domainstats",
                "EndpointID": "4384c3eeee12b13bdf61f9b88b92bf1a58e5ba8988f4076333a8
                "MacAddress": "02:42:ac:12:00:03",
                "IPv4Address": "172.18.0.3/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {}
    }
]
jslab@jslab-virtual-machine:~$
```

```
"Containers": {
        "27e1571a40380bbc40c2db9161e65b666cac2e48b1c01020799a563c7c767163": {
            "Name": "so-freqserver",
            "EndpointID": "5443b5e27f18c283aac673a5158c680f1cd16ab7473b96d43ac2cf643d78f488",
            "MacAddress": "02:42:ac:12:00:02",
            "IPv4Address": "172.18.0.2/16",
            "IPv6Address": ""
        },
        "35fde0562d899b0d6cd0e7ac820dfd73a60bde230c170210f35cea7c255b5131": {
            "Name": "so-logstash",
            "EndpointID": "f0dfcc32661fc7fb04e8f5a08f24cbe4d1545f6b82b56375990a4367dbd417a3",
            "MacAddress": "02:42:ac:12:00:05",
            "IPv4Address": "172.18.0.5/16",
            "IPv6Address": ""
        },
        "419f8db86c1ed5fccc28d0a41fb4f059c54dcbf038c3d7056e59956bfa3c0a3c": {
            "Name": "so-kibana",
            "EndpointID": "1af0dd03cc5aadd4ea15f55758e752b1ae45b2fd9f8f647c43c6447259333bab",
            "MacAddress": "02:42:ac:12:00:06",
            "IPv4Address": "172.18.0.6/16",
            "IPv6Address": ""
        },
        "92fd22d9e34dddc90af681aae94dd9e6d6ad208b4df87eb3e549d83064a5371d": {
            "Name": "so-curator",
            "EndpointID": "ed12e89b81146df9beeb46156d778a2554fa8f0bedc43be7956f56c6c56e009b",
            "MacAddress": "02:42:ac:12:00:08",
            "IPv4Address": "172.18.0.8/16",
            "IPv6Address": ""
        },
        "93764999e6975359edeb3a03ca8908b5358b640cbbc21b5793b57463bdfbf7c0": {
            "Name": "so-elastalert",
            "EndpointID": "3d308fafa699188adce990fdd9b4d13aa30bc38595e19b93b3fa286962b7387a",
            "MacAddress": "02:42:ac:12:00:07",
            "IPv4Address": "172.18.0.7/16",
            "IPv6Address": ""
        },
        "a541ecde19ef87b73595305e0958d7208458d745eb66ac5ee66d07d084d8e0b6": {
            "Name": "so-elasticsearch",
            "EndpointID": "ed4125e7734b9c3f46adc328fa8edc61c72f18ec644b605708590893c25512f6",
            "MacAddress": "02:42:ac:12:00:04",
            "IPv4Address": "172.18.0.4/16",
            "IPv6Address": ""
        },
        "c4fd232d54dc571b105c5909742dda1f32635e65bbc85c065ddef536d104dfd6": {
            "Name": "so-domainstats",
            "EndpointID": "4384c3eeee12b13bdf61f9b88b92bf1a58e5ba8988f4076333a87080a2ce6584",
            "MacAddress": "02:42:ac:12:00:03",
            "IPv4Address": "172.18.0.3/16",
            "IPv6Address": ""
        }
    },
```

메모:

- Containers @ so-elastic-net (bridge) : so-curator(172.18.0.8/16), so-elastalert(172.18.0.7/16), so-kibana(172.18.0.6/16), so-logstash(172.17.0.5/16), so-elasticsearch(172.18.0.4/16), so-domainstats(172.18.0.3/16), so-freqserver (172.18.0.2/16)

8. vIDS

❖ ifconfig & ip show link

① **ifconfig**

② **ip link show**

```
jslab@jslab-virtual-machine:~$ ip link show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default qlen 100
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: ens160: <BROADCAST,MULTICAST,NOARP,PROMISC,UP,LOWER_UP> mtu 1500 qdisc mq state UP mode DEFAULT grou
    link/ether 00:0c:29:2e:ea:ea brd ff:ff:ff:ff:ff:ff
3: ens192: <BROADCAST,MULTICAST,NOARP,PROMISC,UP,LOWER_UP> mtu 1500 qdisc mq state UP mode DEFAULT grou
    link/ether 00:0c:29:2e:ea:f4 brd ff:ff:ff:ff:ff:ff
4: ens224: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP mode DEFAULT group default qlen
    link/ether 00:0c:29:2e:ea:fe brd ff:ff:ff:ff:ff:ff
5: docker0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP mode DEFAULT group defaul
    link/ether 02:42:d3:88:91:bc brd ff:ff:ff:ff:ff:ff
6: br-8d1ed97b634e: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP mode DEFAULT grou
    link/ether 02:42:9b:7f:90:e0 brd ff:ff:ff:ff:ff:ff
8: veth4021b3b@if7: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP mo
    link/ether 42:2c:60:88:9a:65 brd ff:ff:ff:ff:ff:ff link-netnsid 0
10: vethcdb21af@if9: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-8d1ed97b634e st
    link/ether b6:35:0c:7e:7d:93 brd ff:ff:ff:ff:ff:ff link-netnsid 0
12: veth591b8ce@if11: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP
    link/ether 7a:02:82:10:c9:70 brd ff:ff:ff:ff:ff:ff link-netnsid 1
14: veth3b98e4f@if13: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-8d1ed97b634e s
    link/ether ca:ee:22:8b:76:41 brd ff:ff:ff:ff:ff:ff link-netnsid 1
16: vetha1d41ca@if15: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP
    link/ether 4e:b4:78:52:47:4b brd ff:ff:ff:ff:ff:ff link-netnsid 2
18: veth783c90b@if17: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-8d1ed97b634e s
    link/ether 8e:c0:e2:fd:7c:cc brd ff:ff:ff:ff:ff:ff link-netnsid 2
20: veth8d500af@if19: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP
    link/ether 82:f5:84:ad:6b:f5 brd ff:ff:ff:ff:ff:ff link-netnsid 3
22: veth0a8d905@if21: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-8d1ed97b634e s
    link/ether 82:6f:c2:ce:cb:aa brd ff:ff:ff:ff:ff:ff link-netnsid 3
24: veth7ef17b0@if23: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP
    link/ether e2:d3:a5:2f:33:52 brd ff:ff:ff:ff:ff:ff link-netnsid 4
26: veth2fc6972@if25: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-8d1ed97b634e s
    link/ether be:9a:dd:51:46:c7 brd ff:ff:ff:ff:ff:ff link-netnsid 4
28: vethbc57b2b@if27: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP
    link/ether 06:e9:55:0d:c7:4a brd ff:ff:ff:ff:ff:ff link-netnsid 5
30: veth7a5200b@if29: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-8d1ed97b634e s
    link/ether 42:e8:33:59:67:d9 brd ff:ff:ff:ff:ff:ff link-netnsid 5
32: vethebda422@if31: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP
    link/ether a6:f3:3a:e2:05:6f brd ff:ff:ff:ff:ff:ff link-netnsid 6
34: veth5284a6f@if33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-8d1ed97b634e s
    link/ether ca:1a:2d:bd:2b:bb brd ff:ff:ff:ff:ff:ff link-netnsid 6
35: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN mode DEFAULT group de
    link/ether 00:00:00:00:00:00 brd ff:ff:ff:ff:ff:ff
36: virbr0-nic: <BROADCAST,MULTICAST> mtu 1500 qdisc pfifo_fast state DOWN mode DEFAULT group default q
    link/ether 52:54:00:a8:82:63 brd ff:ff:ff:ff:ff:ff
jslab@jslab-virtual-machine:~$
```

```
jslab@jslab-virtual-machine:~$ ifconfig
br-8d1ed97b634e: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.19.0.1  netmask 255.255.0.0  broadcast 172.19.255.255
        inet6 fe80::42:9bff:fe7f:90e0  prefixlen 64  scopeid 0x20<link>
        ether 02:42:9b:7f:90:e0  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1853  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

docker0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        inet6 fe80::42:d3ff:fe88:91bc  prefixlen 64  scopeid 0x20<link>
        ether 02:42:d3:88:91:bc  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 4595  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ens160: flags=4163<UP,BROADCAST,RUNNING,NOARP,PROMISC,MULTICAST>  mtu 1500
        inet6 fe80::20c:29ff:fe2e:eaea  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:2e:ea:ea  txqueuelen 1000  (Ethernet)
        RX packets 146538  bytes 40557618 (41.0 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 47495  bytes 4736581 (4.7 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ens192: flags=4163<UP,BROADCAST,RUNNING,NOARP,PROMISC,MULTICAST>  mtu 1500
        inet6 fe80::20c:29ff:fe2e:eaf4  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:2e:ea:f4  txqueuelen 1000  (Ethernet)
        RX packets 120  bytes 12 (12.0 B)
        RX errors 0  dropped 13  overruns 0  frame 0
        TX packets 2  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ens224: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.55.43  netmask 255.255.255.0  broadcast 192.168.55.255
        inet6 fe80::20c:29ff:fe2e:eafe  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:2e:ea:fe  txqueuelen 1000  (Ethernet)
        RX packets 1146  bytes 1.1 MB
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 2  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth4021b3b: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::40ff:fe88:9a65  prefixlen 64  scopeid 0x20<link>
        ether 42:2c:60:88:9a:65  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1853  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

vethcdb21af: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::b4ff:c0ff:fe7d:9393  prefixlen 64  scopeid 0x20<link>
        ether b6:35:0c:7e:7d:93  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1853  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth591b8ce: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::7802:82ff:fe10:c970  prefixlen 64  scopeid 0x20<link>
        ether 7a:02:82:10:c9:70  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth3b98e4f: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::c8ee:22ff:fe8b:7641  prefixlen 64  scopeid 0x20<link>
        ether ca:ee:22:8b:76:41  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

vetha1d41ca: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::4cb4:78ff:fe52:474b  prefixlen 64  scopeid 0x20<link>
        ether 4e:b4:78:52:47:4b  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth783c90b: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::8cc0:e2ff:fefd:7ccc  prefixlen 64  scopeid 0x20<link>
        ether 8e:c0:e2:fd:7c:cc  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth8d500af: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::80f5:84ff:fead:6bf5  prefixlen 64  scopeid 0x20<link>
        ether 82:f5:84:ad:6b:f5  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth0a8d905: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::806f:c2ff:fece:cbaa  prefixlen 64  scopeid 0x20<link>
        ether 82:6f:c2:ce:cb:aa  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth7ef17b0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::e0d3:a5ff:fe2f:3352  prefixlen 64  scopeid 0x20<link>
        ether e2:d3:a5:2f:33:52  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth2fc6972: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::bc9a:ddff:fe51:46c7  prefixlen 64  scopeid 0x20<link>
        ether be:9a:dd:51:46:c7  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

vethbc57b2b: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::4e9:55ff:fe0d:c74a  prefixlen 64  scopeid 0x20<link>
        ether 06:e9:55:0d:c7:4a  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth7a5200b: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::40e8:33ff:fe59:67d9  prefixlen 64  scopeid 0x20<link>
        ether 42:e8:33:59:67:d9  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

vethebda422: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::a4f3:3aff:fee2:056f  prefixlen 64  scopeid 0x20<link>
        ether a6:f3:3a:e2:05:6f  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

veth5284a6f: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet6 fe80::c81a:2dff:febd:2bbb  prefixlen 64  scopeid 0x20<link>
        ether ca:1a:2d:bd:2b:bb  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1146  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

virbr0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.122.1  netmask 255.255.255.0  broadcast 192.168.122.255
        ether 52:54:00:a8:82:63  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

jslab@jslab-virtual-machine:~$
```

메모:

- Images: so-curator, so-elastalert, so-kibana, so-logstash, so-elasticsearch, so-domainstats, so-freqserver (@ /securityonionsolutions/)

8. vIDS

❖ sudo docker image ls

① sudo docker image ls

② sudo docker image inspect c6

```
jslab@jslab-virtual-machine:~$ sudo docker image ls
REPOSITORY                              TAG                 IMAGE ID            CREATED             SIZE
securityonionsolutions/so-freqserver    latest              7430335b16aa        2 months ago        312MB
securityonionsolutions/so-domainstats   latest              0497f0bbe842        2 months ago        400MB
securityonionsolutions/so-elastalert    latest              0ee1d4814674        2 months ago        418MB
securityonionsolutions/so-curator       latest              c1e5b6c06aad        2 months ago        324MB
securityonionsolutions/so-kibana        latest              ce42f28e58ab        2 months ago        800MB
securityonionsolutions/so-logstash      latest              c6f488b28175        2 months ago        708MB
securityonionsolutions/so-elasticsearch latest              862bec843f98        2 months ago        432MB
```

메모:

- Images: so-curator, so-elastalert, so-kibana, so-logstash, so-elasticsearch, so-domainstats, so-freqserver (@ /securityonionsolutions/)

8. vIDS

❖ sudo docker image inspect d9

```
james@so2koren:~$ sudo docker inspect d9
[
    {
        "Id": "sha256:d9fdad195505ad5ea6a60e7aaee69bf0367ab27dcc34c8b5553cdf69a9067ea",
        "RepoTags": [
            "securityonionsolutions/so-freqserver:latest"
        ],
        "RepoDigests": [
            "securityonionsolutions/so-freqserver@sha256:61bc467c2f324badf802ba440d16a6c51e994656c3289e0b008162652 0db45d5"
        ],
        "Parent": "",
        "Comment": "",
        "Created": "2018-03-21T11:37:07.342188782Z",
        "Container": "24006fe709ed3fb27f8bbc69bc0288b7e743a62b419866f2b830426963248ee75",
        "ContainerConfig": {
            "Hostname": "24006fe709ed",
            "Domainname": "",
            "User": "freqserver",
            "AttachStdin": false,
            "AttachStdout": false,
            "AttachStderr": false,
            "ExposedPorts": {
                "10004/tcp": {}
            },
            "Tty": false,
            "OpenStdin": false,
            "StdinOnce": false,
            "Env": [
                "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin"
            ],
            "Cmd": [
                "/bin/sh",
                "-c",
                "#(nop) ",
                "CMD [¥"/bin/sh¥" ¥"-c¥" ¥"/usr/bin/python /opt/freq_server/freq/freq_server.py -ip 0.0.0.0 10004 /opt/freq_server/freq/freq_table.freq¥"]"
            ],
            "ArgsEscaped": true,
            "Image": "sha256:ec0a541b71309f64ef7439bd6247e7c486e2e4b437e76cf5cd8470f2a2ed957a",
            "Volumes": null,
            "WorkingDir": "",
            "Entrypoint": null,
            "OnBuild": null,
            "Labels": {
                "build-date": "20180302",
                "license": "GPLv2",
                "maintainer": "Security Onion Solutions, LLC",
                "name": "CentOS Base Image",
                "vendor": "CentOS"
            },
            "StopSignal": "SIGTERM"
        },
        "DockerVersion": "17.12.1-ce",
        "Author": "",
        "Config": {
            "Hostname": "",
            "Domainname": "",
            "User": "freqserver",
            "AttachStdin": false,
            "AttachStdout": false,
            "AttachStderr": false,
            "ExposedPorts": {
                "10004/tcp": {}
            },
            "Tty": false,
            "OpenStdin": false,
            "StdinOnce": false,
            "Env": [
                "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin"
            ],
            "Cmd": [
                "/bin/sh",
                "-c",
                "/usr/bin/python /opt/freq_server/freq/freq_server.py -ip 0.0.0.0 10004 /opt/freq_server/freq/freq_table.freq"
            ],
            "ArgsEscaped": true,
            "Image": "sha256:ec0a541b71309f64ef7439bd6247e7c486e2e4b437e76cf5cd8470f2a2ed957a",
            "Volumes": null,
            "WorkingDir": "",
            "Entrypoint": null,
            "OnBuild": null,
            "Labels": {
                "build-date": "20180302",
                "license": "GPLv2",
                "maintainer": "Security Onion Solutions, LLC",
                "name": "CentOS Base Image",
                "vendor": "CentOS"
            },
            "StopSignal": "SIGTERM"
        },
        "Architecture": "amd64",
        "Os": "linux",
        "Size": 364767066,
        "VirtualSize": 364767066,
        "GraphDriver": {
            "Data": null,
            "Name": "aufs"
        },
        "RootFS": {
            "Type": "layers",
            "Layers": [
                "sha256:b0309556b7856c62ae5a6d20e5969a950e3b1a96d4404c00b7da739384749 4a",
                "sha256:eb94a721bc95c1d38e0a960271092324 3ef9f4f603b746fbe2cfe1399214 2fa",
                "sha256:c21660fad46366f5907cae3a0001dd618ea66a97756d7ba3d6361 8039cf1fb1a",
                "sha256:520b527d1e617d59389a76a9589e6d28d7ce3dc63e4c3bf21d687af8fbfaa045",
                "sha256:5952dd9ed075457bcca6fcafefdd5c25e105d8002d14cfd101f15a912eb8dbb",
                "sha256:109e031dfae30d7ce1257006fb24f9b7dfa7fa119605a2a8d6608364351e3d50",
                "sha256:cc1b526e161e7e06cf27c4f41ead2ce8cf355f8e81cc91775c8bd055112206 1a"
            ]
        },
        "Metadata": {
            "LastTagTime": "2018-04-16T14:21:01.09338059-04:00"
        }
    }
]
james@so2koren:~$
```

```
"
        "ContainerConfig": {
            "Hostname": "24006fe709ed",
            "Domainname": "",
            "User": "freqserver",
            "AttachStdin": false,
            "AttachStdout": false,
            "AttachStderr": false,
            "ExposedPorts": {
                "10004/tcp": {}
            },
            "Tty": false,
            "OpenStdin": false,
            "StdinOnce": false,
            "Env": [

"PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin"
            ],
            "Cmd": [
                "/bin/sh",
                "-c",
                "#(nop) ",
                "CMD [¥"/bin/sh¥" ¥"-c¥" ¥"/usr/bin/python
/opt/freq_server/freq/freq_server.py -ip 0.0.0.0 10004
/opt/freq_server/freq/freq_table.freq¥"]"
            ],
```

메모:

- X-RDP for Security Onion

8. vIDS

❖ **netdata / ntopng / sshd / Net-tools** (Ubuntu 17.20)

1. **netdata**
   - bash <(curl -Ss https://my-netdata.io/kickstart.sh)
   - http://127.0.0.1:19999/
2. **ntopng** (sidekick)
   - sudo docker run -t -i -d --net=host --name ntopng lucaderi/ntopng-docker

메모:

- 다운로드 주소:
  - ✓ https://github.com/Security-Onion-Solutions/security-onion/blob/master/old/Verify_ISO_14.04.5.2.md
  - ✓ https://github.com/Security-Onion-Solutions/security-onion/releases/download/v14.04.5.3/securityonion-14.04.5.3.iso

8. vIDS

❖ Side-Kick

- **sudo docker run -t -i -d --net=host --name ntopng2 lucaderi/ntopng-docker**

메모:

- sudo docker run -t -i -d -p 3331:3000 --name ntopng1 lucaderi/ntopng-docker