

# Linux Server Deployment & Configuration Within VirtualBox

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## Summary:

This documentation covers the step-by-step process of setting up a Linux server in a VirtualBox environment. It includes downloading and installing Ubuntu Server, configuring basic packages and system upgrades, setting up essential tools, adding users, configuring a firewall, enabling SSH access, enhancing security with Fail2Ban, installing a GUI and Docker, and deploying Portainer and Netdata containers. Screenshots and commands are provided throughout to support replication.

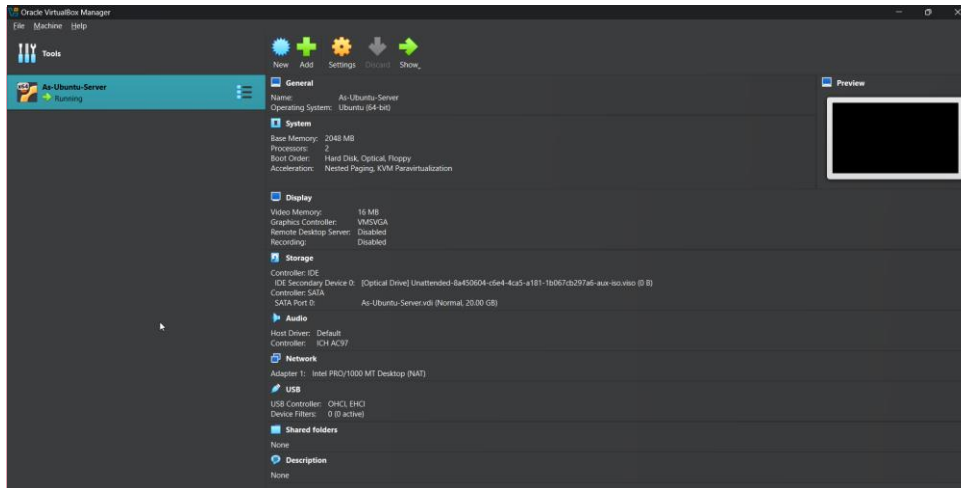
## Skills Demonstrated:

- Virtualization
- Linux server installation and configuration
- Package management with APT
- User and permission management
- Firewall configuration with UFW
- SSH setup and remote access using PuTTY
- Fail2Ban setup for intrusion prevention
- GUI installation and configuration
- Docker and container management
- Monitoring tools (Neofetch, htop, iptraf, Netdata)
- Networking concepts (port forwarding, local-only access)

1. Download VirtualBox & Ubuntu server iso

**Commented [AS1]:** <https://www.virtualbox.org/wiki/Downloads>  
<https://ubuntu.com/download/server/thankyou?version=24.04.2&architecture=amd64&its=true>

Created a new VM with the iso file



**Commented [AS2]:** My virtual machine and the settings.

2. Updated the environment to begin working on it

- `sudo apt update && sudo apt upgrade -y`
- `Sudo apt install unattended-upgrades`
- `Sudo dpkg-reconfigure --priority=low unattended-upgrades`

**Commented [AS3]:** update the package index, upgrade installed packages, install the unattended-upgrades package for automatic updates, and configured it to manage updates.

3. Installed neofetch, htop and other extras and tools

`-add-apt-repository universe, add-apt-repository multiverse, ubuntu-restricted-extras`

`-Curl, wget, xorg, tldr, dust`

**Commented [AS4]:** Enables access to optional software, installs a package that includes various multimedia codecs and fonts necessary for playing restricted formats on Ubuntu.

## Neofetch

**Commented [AS5]:** neofetch displays system information in a visually appealing format in the terminal.

```
As@As-Ubuntu-Server:~$ neofetch

.-/+00SSSS00+/- .
:~+SSSSSSSSSSSSSSSSSSSS~
++SSSSSSSSSSSSSSSSSSSSyySSSS+-
.OSSSSSSSSSSSSSSSSSSSSdMMMMNySSSSO.
/SSSSSSSSSSSShdmmNNmmyNMMMMhSSSSSS/
+SSSSSSSShmydMMMMMMNdddySSSSSSSS+
/SSSSSSSShNMMMyghyyyymNMMMNhSSSSSSSS/
.SSSSSSSdMMMNhSSSSSSSSSShNMMMdSSSSSSSS.
+SSSShhhyNMMMySSSSSSSSSSSSyNMMMySSSSSS+
SSyNMMMNyMMhSSSSSSSSSSSSshmmhSSSSSSSO
SSyNMMMNyMMhSSSSSSSSSSSSshmmhSSSSSSSO
+SSSShhhyNMMMySSSSSSSSSSSSyNMMMySSSSSS+
.SSSSSSSdMMMNhSSSSSSSSSShNMMMdSSSSSSSS.
/SSSSSSSShNMMMyghyyyymNMMMNhSSSSSSSS/
+SSSSSSSSdmydMMMMMMNdddySSSSSSSS+
/SSSSSSSSSShdmmNNNmyNMMMMhSSSSSS/
.OSSSSSSSSSSSSSSSSSSSSdMMMNySSSSO.
++SSSSSSSSSSSSSSSSSSSSyySSSS+-
:~+SSSSSSSSSSSSSSSSSSSS~
.-/+00SSSS00+/- .

As@As-Ubuntu-Server
-----
OS: Ubuntu 24.04.2 LTS x86_64
Host: VirtualBox 1.2
Kernel: 6.8.0-generic
Uptime: 4 mins
Packages: 818 (dpkg)
Shell: bash 5.2.21
Resolution: 1280x800
Terminal: /dev/tty1
CPU: Intel i7-10750H (2) @ 2.592GHz
GPU: 00:02.0 VMware SVGA II Adapter
Memory: 200MiB / 1967MiB
```

## htop

**Commented [AS6]:** htop provides an interactive, real-time view of system processes and resource usage.

```
0% Tasks: 21, 33 thr, 88 kthr: 1 running
0% Load average: 0.00 0.02 0.00
Mem[|||||] 188M/1.92G Uptime: 00:15:09
Swap[ ] 0K/0K

Main I/O
PID USER PRI NI VIRT RES SHR S CPU%MEM% TIME+ Command
1 root 20 0 22428 13284 9316 S 0.0 0.7 0:00.78 /sbin/init splash noprompt noshell automatic-ubuntu
302 root 19 -1 66828 17020 15996 S 0.0 0.8 0:00.00 /usr/lib/systemd/systemd-journald
356 root RT 0 282M 27136 8704 S 0.0 1.3 0:00.01 /sbin/multipathd -d -s
356 root 20 0 25216 7680 8704 S 0.0 0.4 0:00.18 /usr/lib/systemd/systemd-udev
358 root 20 0 282M 27136 8704 S 0.0 1.3 0:00.00 /sbin/multipathd -d -s
369 root RT 0 282M 27136 8704 S 0.0 1.3 0:00.00 /sbin/multipathd -d -s
370 root RT 0 282M 27136 8704 S 0.0 1.3 0:00.00 /sbin/multipathd -d -s
371 root RT 0 282M 27136 8704 S 0.0 1.3 0:00.00 /sbin/multipathd -d -s
372 root RT 0 282M 27136 8704 S 0.0 1.3 0:00.04 /sbin/multipathd -d -s
373 root RT 0 282M 27136 8704 S 0.0 1.3 0:00.00 /sbin/multipathd -d -s
419 systemd-ne 20 0 21580 12800 10624 S 0.0 0.6 0:00.06 /usr/lib/systemd/systemd-resolved
451 systemd-ne 20 0 16992 9472 8320 S 0.0 0.5 0:00.02 /usr/lib/systemd/systemd-networkd
581 messagebus 0 0 9772 5376 4608 S 0.0 0.3 0:00.11 dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --syslog-o
588 polkitd 20 0 374M 9744 7424 S 0.0 0.5 0:00.03 /usr/lib/polkit-1/polkitd --no-debug
599 root 20 0 10124 8704 7680 S 0.0 0.4 0:00.05 /usr/lib/systemd/systemd-logind
602 root 20 0 457M 13312 11264 S 0.0 0.7 0:00.03 /usr/libexec/udisks2/udisksd
621 root 20 0 457M 13312 11264 S 0.0 0.7 0:00.00 /usr/libexec/udisks2/udisksd
622 root 20 0 457M 13312 11264 S 0.0 0.7 0:00.00 /usr/libexec/udisks2/udisksd
625 root 20 0 457M 13312 11264 S 0.0 0.7 0:00.00 /usr/libexec/udisks2/udisksd
632 root 20 0 107M 22912 13568 S 0.0 1.1 0:00.06 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-signal
644 syslog 20 0 217M 6144 4608 S 0.0 0.3 0:00.01 /usr/sbin/rsyslogd -n -iNONE
646 polkitd 20 0 374M 9744 7424 S 0.0 0.5 0:00.00 /usr/lib/polkit-1/polkitd --no-debug
647 polkitd 20 0 374M 9744 7424 S 0.0 0.5 0:00.00 /usr/lib/polkit-1/polkitd --no-debug
648 polkitd 20 0 374M 9744 7424 S 0.0 0.5 0:00.00 /usr/lib/polkit-1/polkitd --no-debug
661 root 20 0 457M 13312 11264 S 0.0 0.7 0:00.00 /usr/libexec/udisks2/udisksd
667 root 20 0 382M 12328 10880 S 0.0 0.6 0:00.05 /usr/sbin/ModemManager
686 root 20 0 457M 13312 11264 S 0.0 0.7 0:00.00 /usr/libexec/udisks2/udisksd
690 root 20 0 382M 12328 10880 S 0.0 0.6 0:00.00 /usr/sbin/ModemManager
692 syslog 20 0 217M 6144 4608 S 0.0 0.3 0:00.00 /usr/sbin/rsyslogd -n -iNONE
693 syslog 20 0 217M 6144 4608 S 0.0 0.3 0:00.00 /usr/sbin/rsyslogd -n -iNONE
694 syslog 20 0 217M 6144 4608 S 0.0 0.3 0:00.00 /usr/sbin/rsyslogd -n -iNONE
695 root 20 0 382M 12328 10880 S 0.0 0.6 0:00.00 /usr/sbin/ModemManager
699 root 20 0 382M 12328 10880 S 0.0 0.6 0:00.00 /usr/sbin/ModemManager
720 root 20 0 107M 22912 13568 S 0.0 1.1 0:00.00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-signal
969 root 20 0 288M 2560 2432 S 0.0 0.1 0:00.10 /usr/bin/VBoxORMCClient
971 root 20 0 288M 3596 3200 S 0.0 0.2 0:00.00 /usr/sbin/VBoxService --pidfile /var/run/vboxadd-service.sh
975 root 20 0 288M 2560 2432 S 0.0 0.1 0:00.00 /usr/bin/VBoxORMCClient
976 root 16 -4 288M 2560 2432 S 0.0 0.1 0:00.06 /usr/bin/VBoxORMCClient
977 root 20 0 288M 3596 3200 S 0.0 0.2 0:00.00 /usr/sbin/VBoxService --pidfile /var/run/vboxadd-service.sh
978 root 20 0 288M 3596 3200 S 0.0 0.2 0:00.00 /usr/sbin/VBoxService --pidfile /var/run/vboxadd-service.sh
979 root 20 0 288M 2560 2432 S 0.0 0.1 0:00.02 /usr/bin/VBoxORMCClient
```

4. Created 2 other users and added them to groups

```
As@As-Ubuntu-Server:~$ groups
As sudo vboxsf
As@As-Ubuntu-Server:~$ groups user1
user1 : user1 users
As@As-Ubuntu-Server:~$ groups user2
user2 : user2 guest
```

**Commented [AS7]:** Users As, User1, User2 and their groups

5. Attached Guest additions

-In virtualBox attached the guest additions iso

-in the VM menu Display > insert Guest additions Image

```
-sudo apt install build-essential dkms linux-headers-$(uname -r)
```

-sudo mkdir -p /mnt/cdrom

-sudo mount /dev/cdrom /mnt/cdrom

-sudo sh /mnt/cdrom/VBoxLinuxAdditions.run

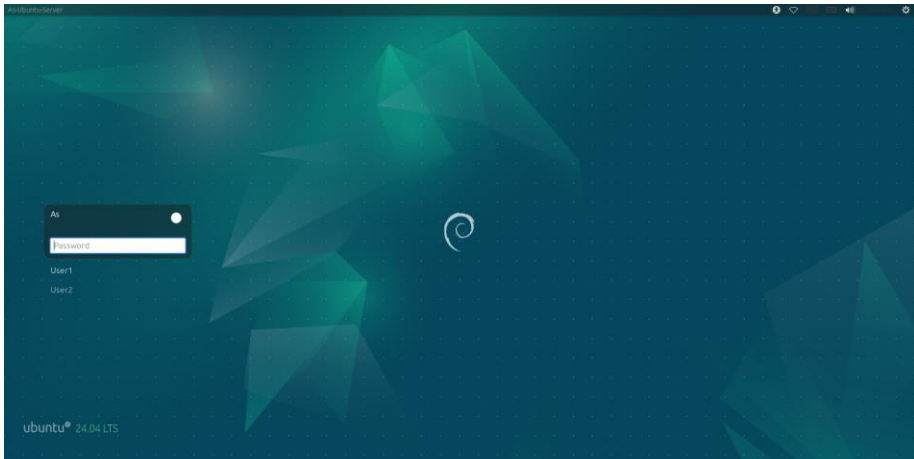
**Commented [AS8]:** Installs compiler tools, automatically builds and install kernel modules, installs headers for the current kernel version.

6. Installed a Gui (cinnamon core) and a display manager (lightdm)

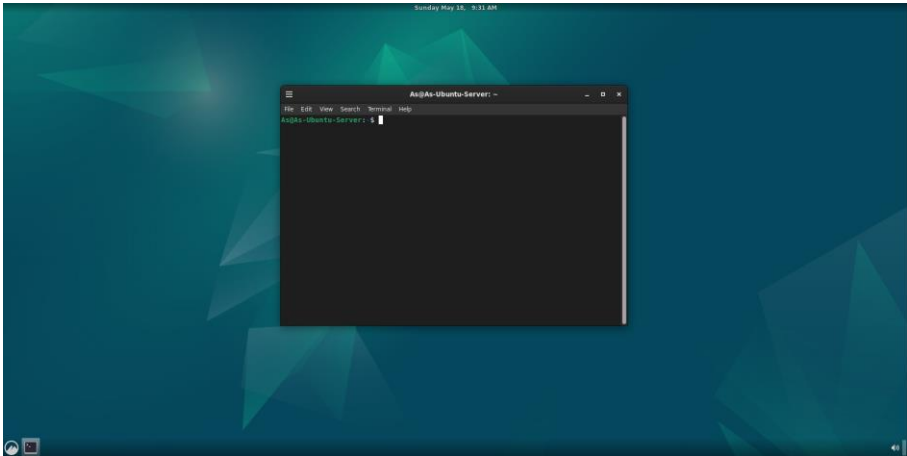
`-sudo dpkg-reconfigure lightdm`

**Commented [AS9]:** Sets lightdm as default display manager.

Lightdm



Cinnamon-core



7. Configured firewall

Deny incoming, allow outgoing, allow ssh from local network, logging on

```
As@As-Ubuntu-Server: ~  
File Edit View Search Terminal Help  
As@As-Ubuntu-Server:~$ sudo ufw status verbose  
Status: active  
Logging: on (low)  
Default: deny (incoming), allow (outgoing), deny (routed)  
New profiles: skip  
  
To Action From  
--  
22 ALLOW IN 10.0.0.0/8
```

Commented [AS10]: Allowed SSH in from local network.

8. Installed OpenSSH & fail2ban

-Sudo apt install openssh-server

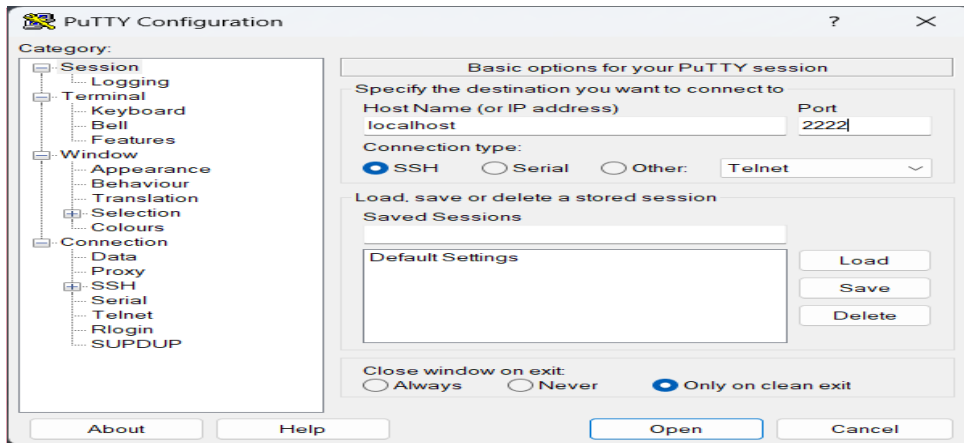
-sudo systemctl enable ssh, -sudo systemctl start ssh

Commented [AS11]: Enables and starts the service.

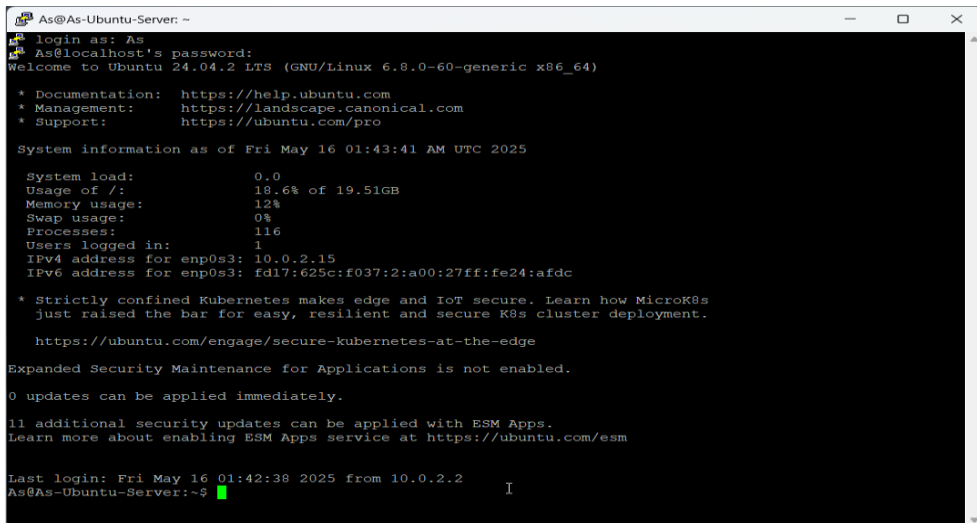
Set up port forwarding in VirtualBox

Port Forwarding Rules					
Name	Protocol	Host IP	Host Port	Guest IP	Guest Port
SSH	TCP		2222		22

Utilized Putty on host machine and connected via SSH



Commented [AS12]: Can be SSH into by using "localhost" or the hosts IP address.



Commented [AS13]: Successful SSH login.

-Sudo apt install fail2ban -y

-sudo cp /etc/fail2ban/jail.conf /etc/fail2ban/jail.local

-sudo nano /etc/fail2ban/jail.local

**Commented [AS14]:** Copies the default Fail2ban config file (jail.conf) to a local override file (jail.local) so you can safely customize settings without risking them being overwritten during updates.

**Commented [AS15]:** opens the editor for the jail.local file

Made this edit in the jail.local file under sshd

```
[sshd]
enabled=true
port    = ssh
logpath = %(sshd_log)s
maxretry = 5
findtime = 300
bantime = 300
backend = systemd
#Enables SSH monitor (port 22) & ban Failed login attempts afterfor 5 min after 5 tries
```

**Commented [AS16]:** After 5 incorrect attempts to SSH into the server the Ip is banned for 5 Minutes.

-sudo fail2ban-client status sshd

**Commented [AS17]:** Shows # of IP banned, log file used, config in effect



Incorrectly input credentials then viewed the sshd status on Server to test

```
ASPC2 - PuTTY
login as:
@localhost's password:
Access denied
@localhost's password:
Access denied
@localhost's password:
Access denied
@localhost's password:
Access denied
@localhost's password:
Access denied
@localhost's password:
```

Commented [AS18]: My failed login attempts through SSH.

```
As@As-Ubuntu-Server:~$ sudo fail2ban-client status sshd
Status for the jail: sshd
- Filter
| - Currently failed: 0
| - Total failed: 5
| - Journal matches: _SYSTEMD_UNIT=sshd.service + _COMM=sshd
- Actions
| - Currently banned: 1
| - Total banned: 1
| - Banned IP list: 10.0.2.2
As@As-Ubuntu-Server:~$
```

Commented [AS19]: My IP being temporarily banned.

## 9. Installed docker and set up a container with portainer

```
- sudo usermod -aG docker $USER
```

**Commented [AS20]:** Adds the current user to the docker group, allowing them to run Docker commands without sudo.

```
- sudo apt install apt-transport-https ca-certificates curl software-properties-common -y
```

```
- curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
```

```
- sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
```

**Commented [AS21]:** installs required packages for secure package transfer, certificate handling, and software management, Downloads Docker's GPG key and adds it to your system for verifying Docker's packages, Adds the Docker repository to your system for package installation.

```
- sudo apt install docker-ce -y
```

```
- sudo systemctl enable docker
```

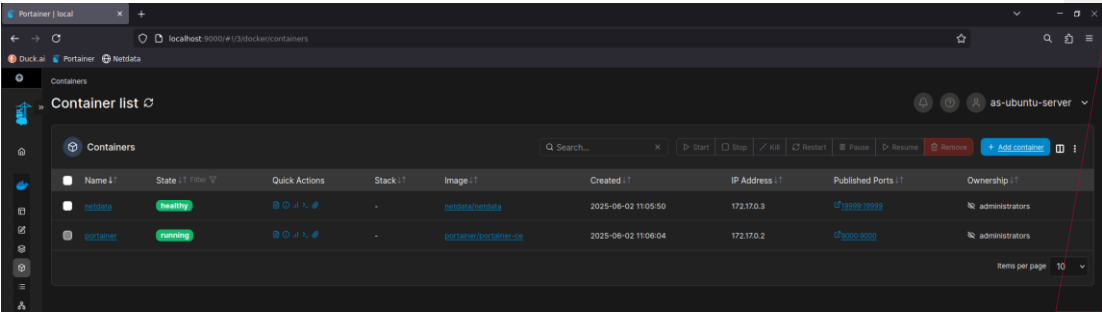
```
- sudo systemctl start docker
```

```
- docker pull netdata/netdata
```

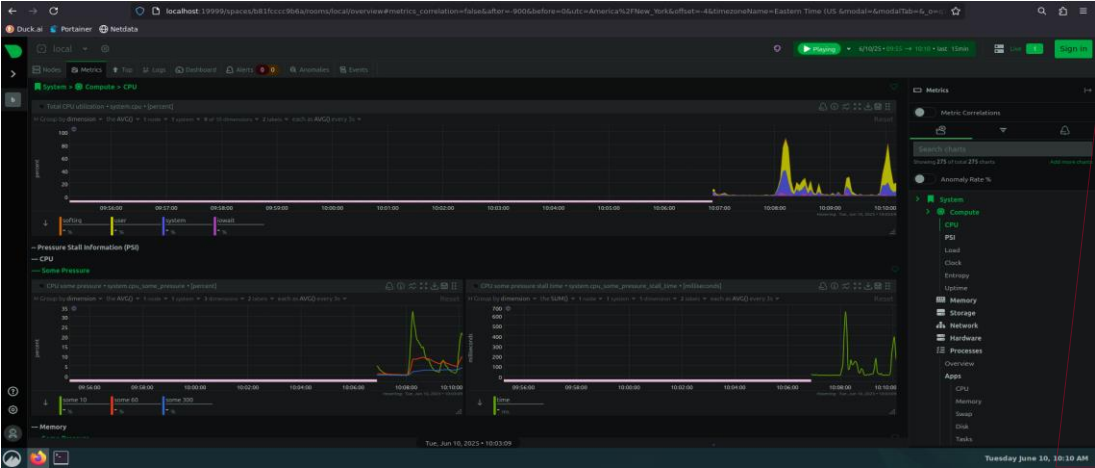
**Commented [AS22]:** Downloads the Netdata monitoring tool image from Docker Hub

-Then created the 2 containers

Portainer and netdata containers running



Commented [AS23]: Portainer web interface on port 9000 showing 2 containers active.



Commented [AS24]: netdata on port 1999 showing metrics for the server.

### Updated firewall Rules to only allow local host to access the containers

```
As@As-Ubuntu-Server: ~  
File Edit View Search Terminal Help  
As@As-Ubuntu-Server:~$ sudo ufw status verbose  
  
Status: active  
Logging: on (low)  
Default: deny (incoming), allow (outgoing), deny (routed)  
New profiles: skip  
  
To Action From  
--  
22 ALLOW IN 10.0.0.0/8  
  
19999 ALLOW IN 127.0.0.1  
  
9000 ALLOW IN 127.0.0.1
```

**Commented [AS25]:** Containers live on ports 9000 & 19999 and the local host is 127.0.0.1

### 10. Installed iptraf to monitor packets

```
As@As-Ubuntu-Server: ~  
File Edit View Search Terminal Help  
iptraf-ng 1.2.1  
Statistics for enp0s3  
  
Total Incoming Incoming Outgoing Outgoing  
Packets Bytes Packets Bytes Packets Bytes  
Total: 23 2353 9 994 14 1359  
IPv4: 20 2057 8 890 12 1167  
IPv6: 3 288 1 96 2 192  
TCP: 8 813 2 84 6 729  
UDP: 12 1244 6 806 6 438  
ICMP: 1 96 1 96 0 0  
Other IP: 2 192 0 0 2 192  
Non-IP: 0 0 0 0 0 0  
Broadcast: 0 0 0 0 0 0  
  
Total rates: 2.11 kbps Broadcast rates: 0.00 kbps  
1 pps 0 pps  
  
Incoming rates: 0.72 kbps  
0 pps  
  
Outgoing rates: 1.38 kbps  
0 pps  
  
IP checksum errors: 0  
  
Time: 0:02 Drops: 0  
X-exit
```

**Commented [AS26]:** Real time network monitoring tool that can monitor traffic by ports, protocols, packet and byte counts.