

Uni Software Defined Infrastructure Notes

Felix Pojtinger

December 6, 2021

Introduction

Contributing

License

Hosts

User

SSH

UFW

APT

Traefik

Cockpit

DNS

Manager

Worker

Exercises

LDAP

Apache

Introduction

Contributing

Contributing

These study materials are heavily based on [professor Goik's "Software Defined Infrastructure" lecture at HdM Stuttgart](#).

Found an error or have a suggestion? Please open an issue on GitHub (github.com/pojointfx/uni-sdi-notes):



Figure 1: QR code to source repository

If you like the study materials, a GitHub star is always appreciated :)

License

License



Figure 2: AGPL-3.0 license badge

Uni Software Defined Infrastructure Notes (c) 2021 Felix Pojtinger and contributors

SPDX-License-Identifier: AGPL-3.0

Hosts

Hosts

Add the following A and AAAA records to a public DNS server (with root domain alphahorizon.io):

felixs-sdi1	10800	IN	A	138.68.70.72
felixs-sdi1	10800	IN	AAAA	2a03:b0c0:3:d0::e34
*.felixs-sdi1	10800	IN	A	138.68.70.72
*.felixs-sdi1	10800	IN	AAAA	2a03:b0c0:3:d0::e34
felixs-sdi2	10800	IN	A	159.223.25.154
felixs-sdi2	10800	IN	AAAA	2a03:b0c0:3:d0::109
*.felixs-sdi2	10800	IN	A	159.223.25.154
*.felixs-sdi2	10800	IN	AAAA	2a03:b0c0:3:d0::109

User

User

```
ssh root@felixs-sdi1.alphahorizon.io  
adduser pojntfx  
usermod -aG sudo pojntfx  
su pojntfx
```

SSH

SSH

```
sudo apt update
sudo apt install -y openssh-server
sudo systemctl enable --now ssh
mkdir -p ~/.ssh
chmod 700 ~/.ssh
curl 'https://github.com/pojntfx.keys' | tee -a ~/.ssh/authorized_keys
chmod 600 ~/.ssh/authorized_keys
exit
```

UFW

UFW

```
ssh pojntfx@felixs-sdi1.alphahorizon.io
sudo apt update
sudo apt install -y ufw
sudo systemctl enable --now ufw
sudo ufw default deny incoming
sudo ufw default allow outgoing
sudo ufw allow OpenSSH
sudo ufw enable
```

APT

APT

```
sudo apt update
sudo apt install -y unattended-upgrades

sudo vi /etc/apt/apt.conf.d/50unattended-upgrades # Now re
Unattended-Upgrade::Origins-Pattern {
    "origin=*";
}
Unattended-Upgrade::Automatic-Reboot "true";
Unattended-Upgrade::Automatic-Reboot-Time "02:00";

sudo dpkg-reconfigure unattended-upgrades # Answer with yes
sudo systemctl enable --now unattended-upgrades
sudo unattended-upgrades --debug # Test the configuration;
sudo reboot # If required
```

Traefik

Traefik

```
$ sudo apt update
$ sudo apt install -y docker.io
$ sudo systemctl enable --now docker
$ sudo mkdir -p /etc/traefik
$ sudo tee /etc/traefik/traefik.yaml<<'EOT'
```

entryPoints:

dnsTcp:

address: ":53"

dnsUdp:

address: ":53/udp"

web:

address: ":80"

websecure:

address: ":443"

Cockpit

Cockpit

```
echo 'deb http://deb.debian.org/debian bullseye-backports n
sudo apt update
sudo apt install -t bullseye-backports -y cockpit
```

DNS

Manager

Manager

```
sudo apt update
sudo apt install -y bind9 bind9utils
sudo systemctl enable --now named
```

```
sudo vi /etc/bind/named.conf.options # Now add the following
listen-on port 54 { 127.0.0.1; };
listen-on-v6 port 54 { ::1; };
```

```
version "not currently available";
recursion yes;
querylog yes;
allow-transfer { none; };
allow-query { any; };
```

```
sudo tee -a /etc/bind/named.conf.local <<'EOT'
zone "example.pojtinger" {
    type master;
    file "/etc/bind/db.example.pojtinger";
```


Worker

Worker

```
sudo apt update
sudo apt install -y bind9 bind9utils
sudo systemctl enable --now named
```

```
sudo vi /etc/bind/named.conf.options # Now add the following
listen-on port 54 { 127.0.0.1; };
listen-on-v6 port 54 { ::1; };
```

```
version "not currently available";
recursion yes;
querylog yes;
allow-transfer { none; };
allow-query { any; };
```

```
sudo tee -a /etc/bind/named.conf.local <<'EOT'
zone "example.pojtinger" {
    type slave;
    file "db.example.pojtinger";
```

Exercises

Exercises

Use the dig command to query A/CNAME/MX/NS records from various machines/domains of your choice. Then execute reverse lookups as well.

```
# Get A/AAA records from manager server
```

```
$ dig +noall +answer @138.68.70.72 example.pojtinger A
```

```
example.pojtinger.      3600    IN      A       138.68.70.72
```

```
$ dig +noall +answer @138.68.70.72 example.pojtinger AAAA
```

```
example.pojtinger.      3600    IN      AAAA    2a03:b0c0:3
```

```
# Get A/AAAA records from worker server
```

```
$ dig +noall +answer @159.223.25.154 example.pojtinger A
```

```
example.pojtinger.      3600    IN      A       138.68.70.72
```

```
$ dig +noall +answer @159.223.25.154 example.pojtinger AAAA
```

```
example.pojtinger.      3600    IN      AAAA    2a03:b0c0:3
```

```
# Get NS record
```

```
$ dig +noall +answer @159.223.25.154 example.pojtinger NS
```

```
example.pojtinger      3600    IN      NS      ns1.example.pojtinger.
```

LDAP

LDAP

```
sudo apt update
```

```
sudo apt install -y slapd ldap-utils certbot
```

```
sudo dpkg-reconfigure slapd # ldap.felixs-sdi1.alphahorizon
```

```
curl ldaps://ldap.felixs-sdi1.alphahorizon.io:443 # Test th
```

```
socat tcp-listen:8389,fork openssl:ldap.felixs-sdi1.alphah
```

```
curl ldap://localhost:8389 # Test the proxy's connection
```

```
# Connect in Apache Directory Studio with the following in
```

```
# Hostname: localhost
```

```
# Port: 8389
```

```
# Bind DN or user: cn=admin,dc=ldap,dc=felixs-sdi1,dc=alpha
```

```
# Bind password: The password from `sudo dpkg-reconfigure s
```

```
# Connect with ldapwhoami like so:
```

```
ldapwhoami -H 'ldaps://ldap.felixs-sdi1.alphahorizon.io:443
```

Apache

Apache

```
sudo apt update
sudo apt install -y apache2
sudo vi /etc/apache2/ports.conf # Now replace/add the follow
Listen 8080
sudo systemctl restart apache2
sudo systemctl enable --now apache2
sudo systemctl status apache2

sudo tree -T "Example Index" -H '.' -o /var/www/html/index
sudo mkdir -p /var/www/sdidoc
sudo tree -T "Example Index For sdidoc" -H '.' -o /var/www/
sudo tee /etc/apache2/sites-available/apache.felixs-sdi1.al
<VirtualHost *:8080>
    ServerName felixs-sdi1.alphahorizon.io
    ServerAlias apache.felixs-sdi1.alphahorizon.io

    ServerAdmin webmaster@alphahorizon.io
    DocumentRoot /var/www/html
```


MariaDB and phpMyAdmin

MariaDB and phpMyAdmin

```
sudo apt update
```

```
sudo apt install -y mariadb-server
```

```
sudo mysql_secure_installation # Empty string, y, y, yourpass
```

```
sudo mysql -u root -e 'GRANT ALL PRIVILEGES ON *.* TO 'phpmyadmin'
```

```
sudo apt install -y phpmyadmin libapache2-mod-php # apache2
```

```
sudo phpenmod mbstring
```

```
sudo a2disconf phpmyadmin
```

```
sudo tee /etc/apache2/sites-available/phpmyadmin.felixs-sdi1.conf
```

```
<VirtualHost *:8080>
```

```
    ServerName felixs-sdi1.alphahorizon.io
```

```
    ServerAlias phpmyadmin.felixs-sdi1.alphahorizon.io
```

```
    ServerAdmin webmaster@alphahorizon.io
```

```
    DocumentRoot /usr/share/phpmyadmin
```

LDAP Account Manager

LDAP Account Manager

```
sudo apt update
```

```
sudo apt install -y ldap-account-manager
```

```
sudo a2disconf ldap-account-manager
```

```
sudo tee /etc/apache2/sites-available/ldap-account-manager.conf
```

```
<VirtualHost *:8080>
```

```
    ServerName felixs-sdi1.alphahorizon.io
```

```
    ServerAlias ldap-account-manager.felixs-sdi1.alphahorizon.io
```

```
    ServerAdmin webmaster@alphahorizon.io
```

```
    DocumentRoot /usr/share/ldap-account-manager
```

```
    ErrorLog ${APACHE_LOG_DIR}/error.log
```

```
    CustomLog ${APACHE_LOG_DIR}/access.log combined
```

```
<Directory "/usr/share/ldap-account-manager">
```

```
    Options +FollowSymLinks
```