

Uni Software Defined Infrastructure Notes

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Introduction

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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

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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

sudo ufw allow 'LDAPS' # TODO: Setup certbot

export CERT_LOCATION="$(sudo bash -c 'find /var/lib/caddy/.'
export KEY_LOCATION="$(sudo bash -c 'find /var/lib/caddy/.'

sudo mkdir -p /etc/openldap
sudo tee -a /etc/openldap/slapd.conf <<EOT
# TODO: Chown/ln and use CERT_LOCATION and KEY_LOCATION for
EOT
```