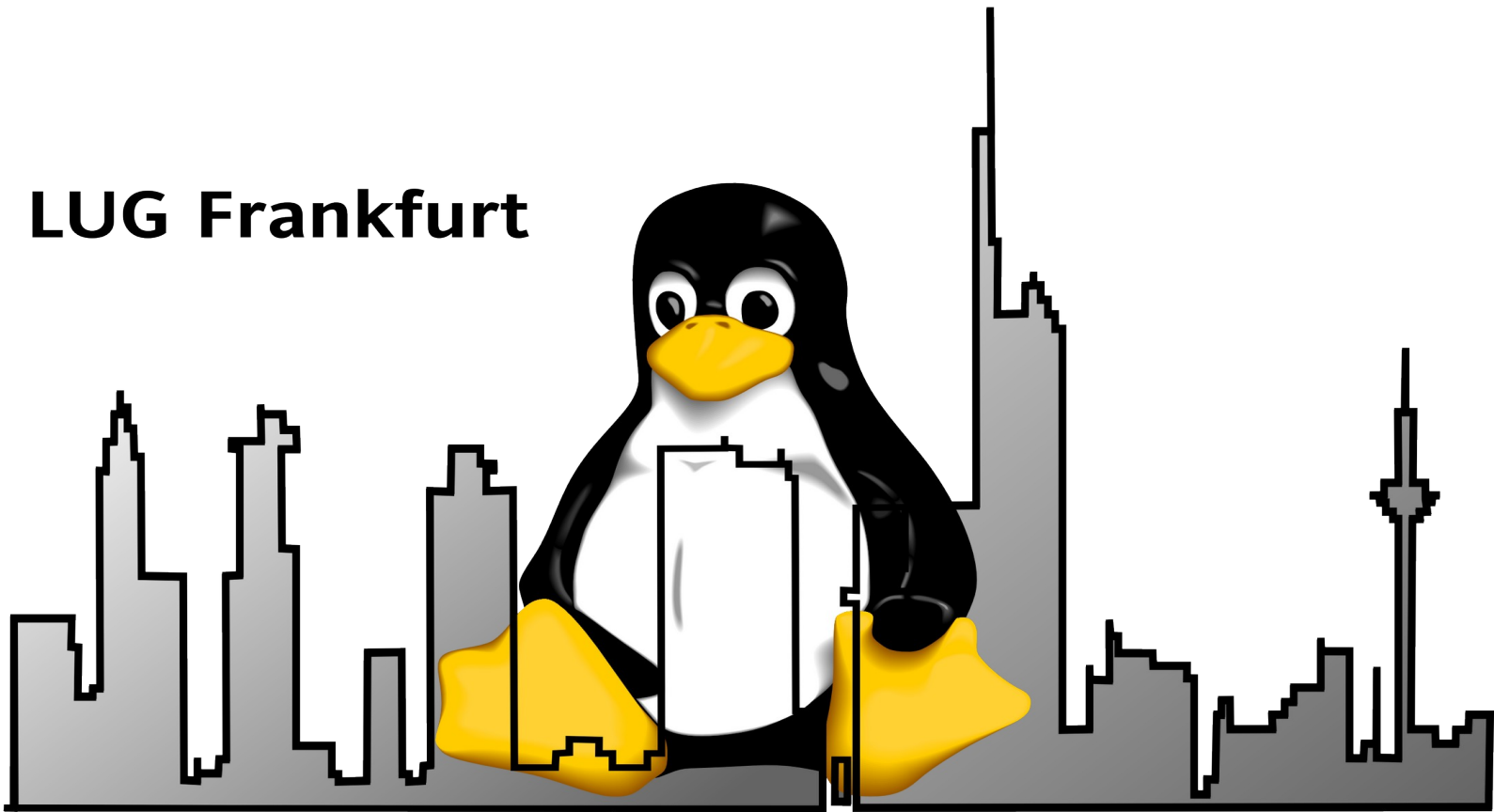
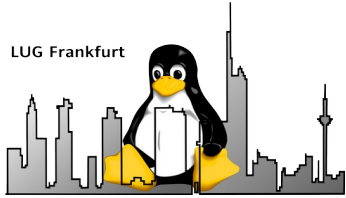


# Debian-DHCP+DDNS

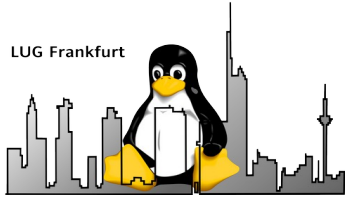
**LUG Frankfurt**





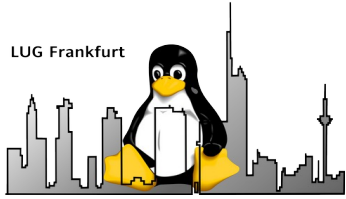
# Inhalt

- Motivation und Konzept für router+DNS+DHCP
- Basis-Infos DHCP
- Virtuelle Maschine clonen
- Installation / Konfiguration DHCP (inkl. Test)
- DDNS konfigurieren
- Zusammenspiel DNS und DHCP (Test)
- Ausblick auf weitere mögliche Themen



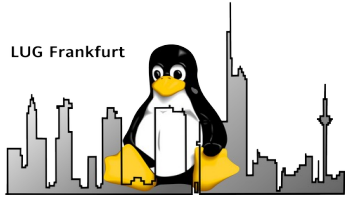
# Konzept

- Vier virtuelle Maschinen
  - fralug-rtg (router-gateway-firewall)
  - fralug-local (Testmaschine)
  - fralug-dns (DDNS-Server)
  - fralug-dhcp (DHCP-Server)
- Getrennte virtuelle Maschinen für jede Funktion



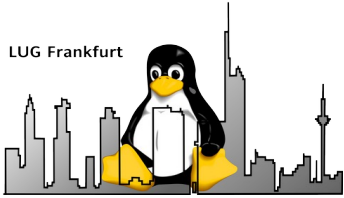
# Bisherige virtuelle Maschinen

- Router: fralug-rtg
- DNS-Server: fralug-dns
- Lokale virtuelle Maschine für Tests: fralug-local



# Inhalt

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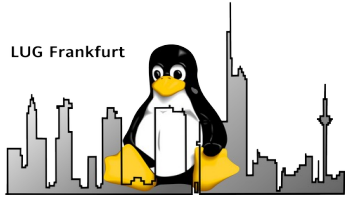
# DHCP-Basis-Info

- Ziele:
  - Zentrale Administration von IP-Subnetzen
  - Automatisches Zuweisen von IP-Adressen

- Begriff: Lease

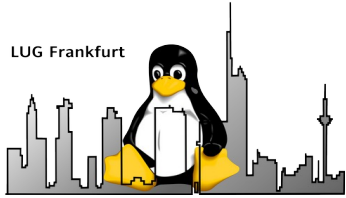
- Ablauf

Initialisierung → Auswahl → Anforderung → Bindung →  
Erneuern → Wiederverbinden



# Inhalt

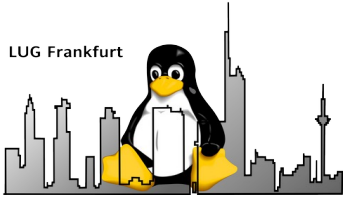
- Motivation und Konzept für router+DNS+DHCP
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# Clone erstellen und anpassen

- fralug-local → fralug-dhcp
  - Lokale Anpassungen vornehmen
    - **Eineindeutige** UUIDs aller Partitionen!
    - Dateien anpassen: hosts, hostname, fstab, grub
    - *clone\_vm.sh* : vollständiger Clone inkl. lokaler Anpassungen
- Im Testnetz als eigenständige Maschine sichtbar.





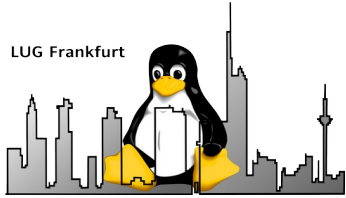
# fralug-dhcp-1

- Statische IP-Adresse für das lokale Netz

## **/etc/network/interfaces**

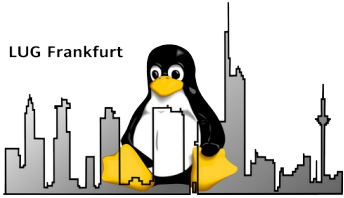
```
# The primary network interface
allow-hotplug enp0s3
iface enp0s3 inet static
    address 10.66.80.249
    netmask 255.255.255.0
    network 10.66.80.0
    broadcast 10.66.80.255
    gateway 10.66.80.254
```

- Für DHCP-Server sind statische IP-Adressen erforderlich!



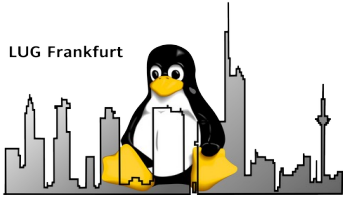
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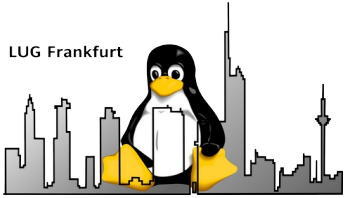
# DHCP-Installation

- Minimaler DHCP-Server installieren
  - aptitude install isc-dhcp-server
  - aptitude purge isc-dhcp-client isc-dhcp-comon
- Anfragen beschränken auf lokale Schnittstelle
  - /etc/default/isc-dhcp-server
  - INTERFACESv4="enp0s3"
  - INTERFACESv6=""
- Konfigurationsfiles in /etc/dhcp/**dhcpcd.conf**
  - Zunächst ohne DDNS



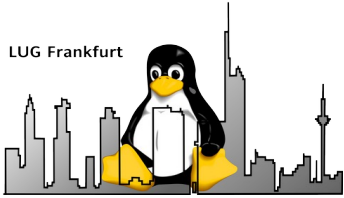
# File: dhcpd.conf

- **`/etc/dhcp/dhcpd.conf`**  
default-lease-time 600;  
max-lease-time 7200;  
ddns-update-style none;  
authoritative;  
  
# Serviced subnets  
subnet 10.66.80.0 netmask 255.255.255.0 {  
    range 10.66.80.32 10.64.80.63;  
    option dhcp-server-identifier 10.66.80.249;  
    option routers 10.66.80.254;  
    option subnet-mask 255.255.255.0;  
    option broadcast-address 10.66.80.255;  
    option domain-name "fralug-net";  
    option domain-name-servers 10.66.80.250;  
}



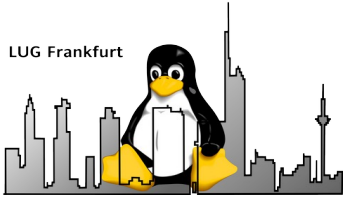
# File: dhclient.conf (fralug-local)

- `/etc/dhcp/dhclient.conf` (fralug-local)  
option rfc3442-classless-static-routes code 121 = array of unsigned integer 8;  
  
send host-name = gethostname();  
request subnet-mask, broadcast-address, time-offset, routers,  
domain-name, domain-name-servers, domain-search,  
# host-name, dhcp6.name-servers, dhcp6.domain-search, dhcp6.fqdn,  
# dhcp6.sntp-servers, netbios-name-servers, netbios-scope,  
interface-mtu, rfc3442-classless-static-routes, ntp-servers;  
  
send dhcp-client-identifier "fralug-net\_fralug-local";



# Test: DHCP+statisches DNS

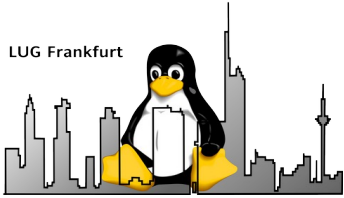
- fralug-local mit DHCP starten
- `/etc/network/interfaces`  
`iface enp0s3 inet dhcp`
- `/etc/resolv.conf`  
`search fralug-net`  
`nameserver 10.66.80.250`
- Reboot (fralug-local)
- ping dns; ping rtg
- ping [www.heise.de](http://www.heise.de)



# Start von fralug-local

- /var/log/syslog (fralug-local)

```
dhclient[384]: Listening on LPF/enp0s3/08:00:27:b4:48:a4
dhclient[384]: Sending on Socket/fallback
dhclient[384]: DHCPDISCOVER on enp0s3 to 255.255.255.255 port 67
interval 3
dhclient[384]: DHCP OFFER of 10.66.80.32 from 10.66.80.249
dhclient[384]: DHCP REQUEST for 10.66.80.32 on enp0s3 to
255.255.255.255 port 67
dhclient[384]: DHCP ACK of 10.66.80.32 from 10.66.80.249
dhclient[384]: bound to 10.66.80.32 -- renewal in 228 seconds.
```



# Antwort von fralug-dhcp

- /var/log/syslog (fralug-dhcp)

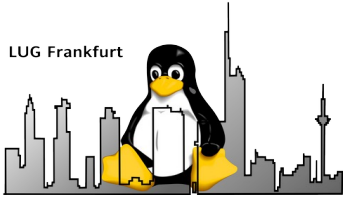
```
dhcpcd[407]: DHCPDISCOVER from 08:00:27:b4:48:a4 via enp0s3
```

```
dhcpcd[407]: DHCPOFFER on 10.66.80.32 to 08:00:27:b4:48:a4  
(fralug-local) via enp0s3
```

```
dhcpcd[407]: DHCPREQUEST for 10.66.80.32 (10.64.80.249) from  
08:00:27:b4:48:a4 (fralug-local) via enp0s3
```

```
dhcpcd[407]: DHCPACK on 10.66.80.32 to 08:00:27:b4:48:a4  
(fralug-local) via enp0s3
```

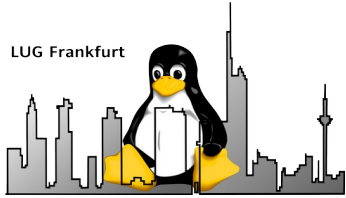




# fralug-dhcp-3

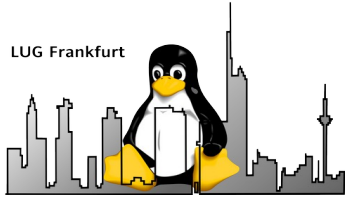
- /var/lib/dhcp/dhcp.leases (fralug-dhcp)

```
lease 10.66.80.32 {
  starts 1 2025/02/08 21:56:50;
  ends 1 2025/02/08 22:06:50;
  cltt 1 2025/02/08 21:56:50;
  binding state active;
  next binding state free;
  rewind binding state free;
  hardware ethernet 08:00:27:b4:48:a4;
  uid "fralug-net_fralug-local";
  client-hostname "fralug-local";
}
```



# Inhalt

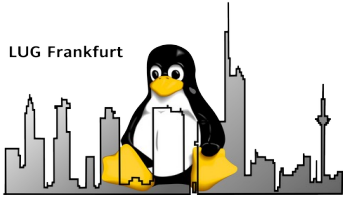
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# DDNS

- Schlüssel zur Authentifizierung der DHCP-Server-Zugriffe
- ddns-confgen

```
key DHCP_UPDATER {  
    algorithm hmac-sha256;  
    secret "sB0aKhQUF8ha9QglvXIggwjWa910Mxtb6TY21hLUPwU=";  
};
```

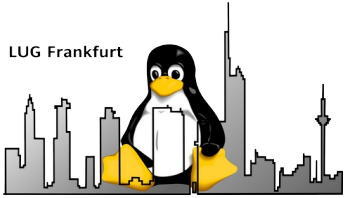


# File: named.conf (mit DDNS)

- `/etc/bind/named.conf` (options bleiben unverändert)
  - `/etc/bind/named.conf` (Zonendefinition)
- ```
key DHCP_UPDATER {algorithm hmac-sha256;
    secret "sB0aKhQUF8ha9QglvXIggwjWa910Mxtb6TY21hLUPwU="; };

zone "." { type hint; file "/etc/bind/db.root"; };
zone "localhost" { type primary; file "/etc/bind/localhost"; };
zone "127.in-addr.arpa" { type primary; file "/etc/bind/localhost.rev"; };

// fralug-net
zone "fralug-net" { type primary; file "/etc/bind/fralug-net";
    allow-update { key DHCP_UPDATER; }; notify yes; };
zone "80.66.10.in-addr.arpa" { type primary;
    file "/etc/bind/fralug-net.rev"; allow-update { key DHCP_UPDATER; };
    notify yes; };
```



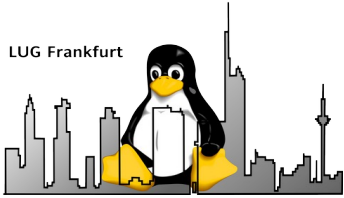
# File: dhcpd.conf-1 (für DDNS)

- **/etc/dhcp/dhcpd.conf**

```
default-lease-time 600;
max-lease-time 7200;
deny client-update;
ddns-update-style standard;
ddns-updates on;          # on ist der Standard
authoritative;

key DHCP_UPDATER {algorithm hmac-sha256;
                    secret "sB0aKhQUF8ha9QglvXIggwjWa910Mxtb6TY21hLUPwU="; }

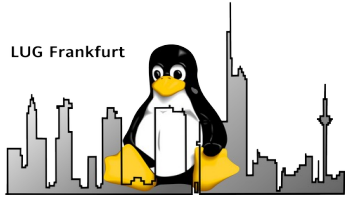
zone fralug-net. { primary 10.66.80.250; key DHCP_UPDATER; }
zone 80.66.10.in-addr.arpa. { primary 10.66.80.250;
                             key DHCP_UPDATER; }
```



# File: dhcpd.conf-2 (für DDNS)

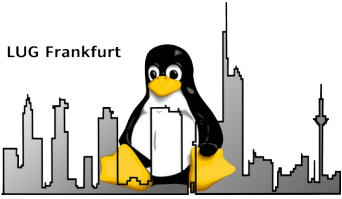
- **/etc/dhcp/dhcpd.conf (Fortsetzung)**

```
# Serviced subnets
subnet 10.66.80.0 netmask 255.255.255.0 {
    range 10.66.80.32 10.64.80.63;
    option dhcp-server-identifler 10.66.80.249;
    option routers 10.66.80.254;
    option subnet-mask 255.255.255.0;
    option broadcast-address 10.66.80.255;
    option domain-name "fralug-net";
    option domain-name-servers 10.66.80.250;
    ddns-domainname "fralug-net.";
    ddns-rev-domainname "in-addr.arpa."; # ist die default-Einstellung
}
```



# Inhalt

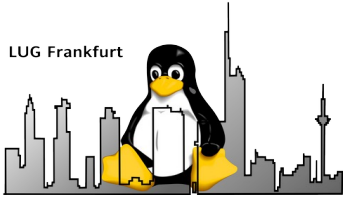
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# fralug-dhcp-2

- Boot-Reihenfolge:  
fralug-rtg → fralug-dns → fralug-dhcp → fralug-local
- Für Tests direkt nur auf fralug-dhcp kenne ich nix passendes
- /var/log/syslog
  - Beim Start der Servers (fralug-dhcp)
  - Beim Booten von fralug-local

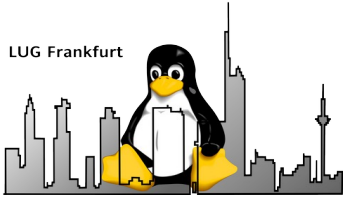




# DHCPD nach Start von fralug-local (DDNS)

- /var/log/syslog (fralug-dhcp)

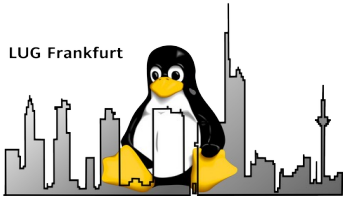
```
dhcpcd[407]: DHCPDISCOVER from 08:00:27:b4:48:a4 via enp0s3
dhcpcd[407]: DHCPOFFER on 10.66.80.32 to 08:00:27:b4:48:a4
    (fralug-local) via enp0s3
dhcpcd[407]: DHCPREQUEST for 10.66.80.32 (10.66.80.249) from
    08:00:27:b4:48:a4 (fralug-local) via enp0s3
dhcpcd[407]: DHCPACK on 10.66.80.32 to 08:00:27:b4:48:a4
    (fralug-local) via enp0s3
dhcpcd[407]: Added new forward map from fralug-local.fralug-net.
    to 10.66.80.32
dhcpcd[407]: Added reverse map from 32.80.66.10.in-addr.arpa. to
    fralug-local.fralug-net.
```



# DNS nach Start von fralug-local (DDNS)

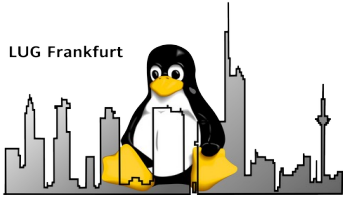
- /var/log/syslog (fralug-dhcp)

```
named[343]: client @0x7f1e4c779d38 10.66.80.249#37283/key dhcp_updater:
  signer "dhcp_updater" approved
named[343]: client @0x7f1e4c779d38 10.66.80.249#37283/key dhcp_updater:
  updating zone 'fralug-net/IN': adding an RR at
  'fralug-local.fralug-net' A 10.66.80.32
named[343]: client @0x7f1e4c779d38 10.66.80.249#37283/key dhcp_updater:
  updating zone 'fralug-net/IN': adding an RR at 'fralug-local.fralug-
  net' DHCPID AAEB2ygxGh7xEPEQSFbF05Z6Fxi8YAANKiQZfV2rEq1AK1M=
named[343]: client @0x7f1e4c775f88 10.66.80.249#38497/key dhcp_updater:
  updating zone '80.66.10.in-addr.arpa/IN': adding an RR at
  '32.80.66.10.in-addr.arpa' PTR fralug-local.fralug-net.
named[343]: zone 80.66.10.in-addr.arpa/IN: sending notifies (serial
  2025020708)
named[343]: zone fralug-net/IN: sending notifies (serial 2025020711)
```



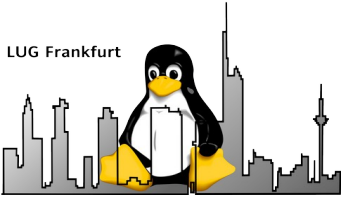
# fralug-net update (DDNS)

```
$TTL 86400          ; 1 day
fralug-net.        IN SOA  rtg.fralug-net. root.rtg.fralug-net. (
                    2025020738 ; serial
                    3600      ; refresh (1 hour)
                    600       ; retry (10 minutes)
                    3600000    ; expire (5 weeks 6 days 16 hours)
                    3600      ; minimum (1 hour)
                    )
                    NS       dns.fralug-net.
                    MX       10 mail.fralug-net.
dhcp.fralug-net.   A        10.66.80.249
dns.fralug-net.   A        10.66.80.250
$TTL 300          ; 5 minutes
fralug-local.fralug-net. A    10.66.80.32
                    DHCID   ( AAEB2ygxGh7xEPEQSFbF05Z6Fxi8YAANKiQZfV2rEq1AK1M= ) ;
                    1 1 32
                    $TTL 86400          ; 1 day
                    mail.fralug-net.   A        10.66.80.251
25.03.2025 rtg.fralug-net.   A        10.66.80.254
```



# fralug-net.rev update (DDNS)

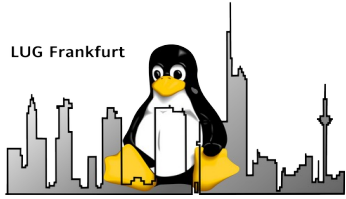
```
$TTL 86400          ; 1 day
80.66.10.in-addr.arpa.  IN SOA  rtg.fralug-net. root.rtg.fralug-net. (
                                2025020726 ; serial
                                3600       ; refresh (1 hour)
                                600       ; retry (10 minutes)
                                3600000   ; expire (5 weeks 6 days 16 hours)
                                3600      ; minimum (1 hour)
                                )
                                NS       dns.fralug-net.
249.80.66.10.in-addr.arpa. PTR    dhcp.fralug-net.
250.80.66.10.in-addr.arpa. PTR    dns.fralug-net.
251.80.66.10.in-addr.arpa. PTR    mail.fralug-net.
254.80.66.10.in-addr.arpa. PTR    rtg.fralug-net.
$TTL 300           ; 5 minutes
32.80.66.10.in-addr.arpa. PTR    fralug-local.fralug-net.
```



# fralug-dhcp-3

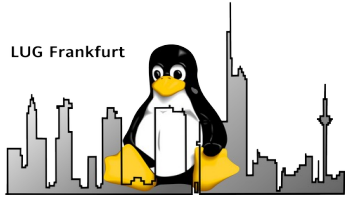
- `/var/lib/dhcp/dhcp.leases (fralug-dhcp)`

```
lease 10.66.80.32 {
  starts 1 2025/02/08 21:56:50;   ends 1 2025/02/08 22:06:50;
  cltt 1 2025/02/08 21:56:50;   binding state active;
  next binding state free;
  rewind binding state free;
  hardware ethernet 08:00:27:b4:48:a4;
  uid "fralug-net_fralug-local";
  client-hostname "fralug-local";
  set ddns-fwd-name = "fralug-local.fralug-net.";
  set ddns-dhcid =
    "\000\001\001\333(1\032\036\361\020\361\020HV\305;\226z\027\030\274`\0
    00\015\222$\031}]\253\022\255@+S";
  set ddns-rev-name = "32.80.66.10.in-addr.arpa.";
}
```



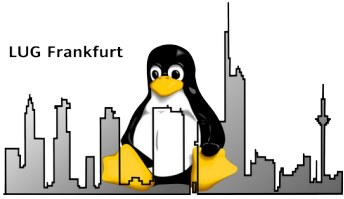
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# Ausblick

- Shrinken von VBox virtuellen Maschinen (`shrink_vm.sh`)
- Clonen von VBox virtuellen Maschinen (`clone_vm.sh`)
- Network block device (NBD)



Ende

**Danke für's zuhören und  
viel Spaß mit Debian**

Fragen und Anmerkungen gerne an [m1ist@hk-vision.de](mailto:m1ist@hk-vision.de)