IOTstack homelab

Author: Ewout van Nimwegen

Hardware

- Raspberry Pi 3B with Raspberry Pi OS Lite kernel version 5.4
- Seagate 1 TB HDD & cable
- Ethernet cable
- MicroUSB cable to USB
- Ali Express 5V 3A power supply
- Ziggo router

Update system

```
PI :~ $ sudo apt-get update -y && sudo apt-get dist-upgrade -y
```

Security

To secure the pi setup a ssh key then remove the remote password setting.

SSH key

```
PI :~ $ mkdir ~/.ssh
PC :~ $ ssh key-gen && scp ~/.ssh/id_rsa.pub hostname@ip:~/.ssh/authorized_keys
```

Remove remote password login

Edit the ssh demon config file.

```
PI :~ $ sudo vim /etc/ssh/sshd_config
```

Restart the ssh demon.

```
PI :~ $ sudo systemctl restart sshd.service
```

Dependencies

Raspberry Pi

```
PI :~ $ sudo apt-get install git curl vim -y
```

PC

- nextcloud
- wireguard

IOTstack

```
PI :~ $ curl -fsSL \
https://raw.githubusercontent.com/SensorsIot/IOTstack/master/install.sh | bash
PI :~ $ cd IOTstack && ./menu.sh
```

For this examples I will install the following containers:

- adminer
- mariadb
- mosquitto
- nextcloud
- nodered
- portainer-ce
- wireguard

Create the compose_override.yml file before building the stack. As the filename suggests, this file overrides the generated config file. So we do not need to worry about editting the config file after adding or removing containers.

```
PI :~ $ touch ~/IOTstack/compose_override.yml && \
vim ~/IOTstack/compose_override.yml
```

```
services:
  wireguard:
    environment:
      - PUID=1000
      - PGID=1000
      - TZ=Europe/Amsterdam
      - SERVERURL=connect-me.duckdns.org
      - SERVERPORT=51820
      - PEERS=10

  nextcloud:
    volumes:
      - ./volumes/nextcloud/html:/var/www/html

  nextcloud_db:
    environment:
      - MYSQL_ROOT_PASSWORD=rootPassword
      - MYSQL_PASSWORD=mysqlPassword
      - MYSQL_DATABASE=nextcloud
      - MYSQL_USER=nextcloud

  mariadb:
    environment:
      - MYSQL_ROOT_PASSWORD=rootPassword
```

```
      - MYSQL_PASSWORD=mysqlPassword
      - MYSQL_DATABASE=nextcloud
      - MYSQL_USER=nextcloud
```

Build and launch the stack. Then launch the portainer-ce browser page with http://ip:9000. Use this gui to easily manage your containers.

Dynamic DNS

Dynamic DNS is a method to automatically update the I.P. address of your self hosted instance. We will use DuckDNS for this example. Go to duckdns.org and create an account. Get a domain, I'm using connect-me.duckdns.org, it is possible to duplicate mine, because every account is bound to an address and a specific token.

```
PI :~ $ vim ~/IOTstack/duck/duck.sh
```

Add the domain and token.

```
DOMAINS="connect-me.duckdns.org"
DUCKDNS_TOKEN="r61bg77a-cd9b-4f48-ad34-560bcf543221"
```

Execute the script every 5 minutes with crontab.

```
PI :~ $ crontab -e
```

Add this line.

```
*/5 * * * * sudo ~/IOTstack/duck/duck.sh >/dev/null 2>&1
```

VPN setup

Security key We've already installed Wireguard. Copy the security key or QR code to your devices.

With scp:

```
PI :~ $ scp IOTstack/services/wireguard/config/peer1/peer1.png \
hostname@ip:~/peer1.png
```

Port forwarding Open a webpage and enter your routers I.P. address. Allow all external I.P.'s to forward data through UDP port 51820 to your device's I.P. address.

Use the wireguard app to connect to your VPN.

Issues

I've walked into a few issues they are listed below with the recommended solutions.

1. Wireguard missing kernel headers.

console log

```
**** Kernel headers don't seem to be available, can't compile the module. Sleeping now. . .
```

Solution install the stable kernel headers. source

```
PI :~ $ sudo apt install --reinstall libraspberrypi0  \
libraspberrypi-{bin,dev,doc} raspberrypi-bootloader raspberrypi-kernel
```

Then restart the containers and it should all be fixed.

2. IPv4 port forwarding not possible with Ziggo router.

Solution contact Ziggo, ask them to downgrade your routers firmware. to support the IPv4 forwarding.

Sources

- IOTstack
- Docker