Instructions to install the Chirpstack on Edge Computer having Ubuntu OS

I. Preparation

1. Laptop/PC having Window OS and Wifi connection
2. Network having Internet access
3. Ethernet cable for Edge PC. They will connect to same network and the network could connect to internet
4. Edge PC & Power Adapter
5. Screen having HDMI port
6. HDMI cable
7. Keyboard
8. Mouse
9. Installation suites of Chirpstack, NodeRED and docker

II. Installation steps

- Download and install bitvis (SSH software) on the Laptop/PC, client version at linkhttps://bitvise.com/download-area
- Connect Edge PC to peripheral devices

  Connect Edge PC to Screen with HMI cable via HMI port, to mouse and keyboard via USB port (USB hub), to Internet with Ethernet cable via Ethernet port then power up the Edge PC. The Edge PC already have Ubuntu OS. After power up the PC will be booted and in command-line GUI (Terminal)

  Note:
  The instructions for Ubuntu 20.04.6

- Update and upgrade Ubuntu OS

  Login Ubuntu with user of ubuntu and password (default password is ubuntu)

  Run command: "sudo su", and input user "root" and password (example of password ofAdmin@!@#) to access root user

  Run command "sudo apt update" to get updated package of Ubuntu OS to the Edge PC

  Run command "sudo reboot" to reboot after update. After rebooting, login server, access root user

  Run command "sudo apt upgrade" to upgrade latest version of OS

  Run command "sudo reboot" to reboot after upgrade. After rebooting, login server, access root user

- Open and configure ssh service

  Run command "sudo apt install -y openssh-server" to install the OpenSSH server on your system.

  Run command "sudo systemctl status ssh" to show the current status of the SSH service, including whether it is active (running) or inactive (stopped).

  Run command "sudo systemctl enable ssh" to configure the SSH service to start automatically at boot.

  Run command "sudo reboot" to reboot after configuring ssh. After rebooting, login server, access root user

  Run command "ip a" in the terminal will display the current network interfaces and their configurations. This includes details such as IP addresses, MAC addresses, and the status of each interface. Note out the IP address for later usage

- Edit ssh configuration file

Input command "sudo nano /etc/ssh/sshd_config" to open the SSH server configuration file in the Nano text editor with superuser privileges.
Move a cursor on the file by using 4 arrow keys on the keyboard , then delete " #" at "port 22" and at "PermitRootLogin", and change "PermitRootLogin" to "yes", then click Ctrl & X, click Y to save ssh configuration file
Input command "sudo systemctl restart ssh" to restart the SSH service on your system to apply the change of the SSH configuration file

- Copy installation suites from PC/laptop to Edge PC

Open bitvise software then input Edge PC IP, port of 22, user root and password (Example password of Admin@!@#), click Login, click NEW SFPT WINDOW to transfer files. Click /home on the right section to show all folder in "home"

Select installation folder of Chirpstack, NodeRED and docker on the PC/laptop on the left section, click upload to copy to home on Edge PC

Link for installation suits: https://filerun.daviteq.com/wl/?id=Pj6oE4zfTl0JUfd2SF1AYateABEYYEhl

- Install docker for Ubuntu

  In the bitvis software, click New Terminal console to open the terminal

  Add Docker's official GPG key by copying below scripts and paste to terminal on ssh software. The paste is implemented by right-click the mouse.

```
sudo apt-get update
sudo apt-get install ca-certificates curl
sudo install -m 0755 -d /etc/apt/keyrings
sudo curl -fsSL https://download.docker.com/linux/ubuntu/gpg -o /etc/apt/keyrings/docker.asc
sudo chmod a+r /etc/apt/keyrings/docker.asc
Add the repository to Apt sources by copying  below scripts and paste to terminal on ssh software.
echo \
"deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc]
https://download.docker.com/linux/ubuntu \
$(. /etc/os-release && echo "${UBUNTU_CODENAME:-$VERSION_CODENAME}") stable" | \
sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
sudo apt-get update
```

  Install the latest Docker packages by implementing command of "sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin"

  Run the command of "docker ps -a" to list all containers on your system and check the docker is available in the list

  Note:
  All above scripts might be updated on link: https://docs.docker.com/engine/install/ubuntu/

- Install the Chirpstack

  Access the folder that contain the Chirpstack installation file with "cd" command and folder path

  Run the command of "docker compose up -d" to start all the services defined in the docker-compose.yml file in detached mode. Here's a quick breakdown:

  - docker compose: The Docker Compose command.
  - up: Creates and starts containers.
  - -d: Runs the containers in detached mode (in the background).

  This command is useful for starting your multi-container Docker applications without tying up your terminal.

  Run the command of "docker compose down" to stop and remove all the containers, networks, and volumes defined in your docker-compose.yml file.

  After completing the Chirpstack installation, access the web URL of "IP:8080" to view the Chirpstack Network Server

  Note:

  These instructions are applied for Chirpstack Version of v4.11.1

- Install the NodeRED

  Access the folder that contain the NodeRED installation file with "cd" command and folder path

  Run the command of "docker compose up -d" to start all the services defined in the docker-compose.yml file in detached mode.

  Run the command of "docker compose down" to stop and remove all the containers, networks, and volumes defined in your docker-compose.yml file.

  Run the command of "chmod -R 777 data" to change the permissions of the data directory and all its contents recursively. Here's a quick breakdown:

- chmod: The command to change file permissions.
- -R: Applies the changes recursively to all files and directories within the specified directory.
- 777: Sets the permissions to read, write, and execute for everyone (owner, group, and others).
- data: The directory you want to change permissions for.

This command grants full access to everyone, which can be useful for certain scenarios but also poses security risks.

After completing the NodeRED installation, access the web URL of "IP:1881" to view the NodeRED

Note:

These instructions are applied for NodeRED Version of NodeRED V3.1.0

- Set/change the static IP for the Edge PC (Optional)

  Run the command of "sudo nano /etc/netplan/50-cloud-init.yaml" to open the Netplan configuration file in the Nano text editor with superuser privileges. Enter your current user password when prompted. Once the file is open, make changes to your network configuration as below example

```
 network:
     ethernets:
             eno1:
                    dhcp4: false
                    optional: true
                    addresses:
                       - 192.168.1.81/24
                    gateway4: 192.168.1.1
                    nameservers:
                       addresses:
                       - 8.8.8.8
             enp1s0:
                     dhcp4: true
                     optional: true
version: 2
```

  After editing, press Ctrl + O to save the changes and Ctrl + X to exit Nano.

- Configure to send uplink of the LoRaWAN sensor to NodeRED application via Chirpstack network server

  Access gateway web GUI, configure NS host, uplink port of 1700, downlink port of 1700 and obtain gateway EUI for later usage

  Access Chirpstack Network Server at URL of "IP:8080", add gateway, create device profile, add application, add end-device

  Access NodeRED at URL of "IP:1881", add MQTT-in in NodeRED with configuration of NS host, port of 1883, uplink topic of "application/+/device/+/event/+"

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