**LAB08-IoT SW installation process**

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1. Clone the code from <https://chatgpt.com/c/67ca72b2-1160-8012-94c2-ceaf6fa6106e>,

you can search other model from ref.site

2. IoT software setup environment/IDE (multiple choice possible)

Ubuntu - Python 3 - VSCode

3. Design IoT software Architecture

| Items | Resource |  |  |  |
| --- | --- | --- | --- | --- |
| VM type |  |  |  |  |
| OS |  |  |  |  |
| IP/URL |  |  |  |  |
| Language,version | Python |  |  |  |
| framework | Node.js |  |  |  |
| Libraries |  |  |  |  |
| Software tool |  |  |  |  |
| Protocol; | MQTT, CoAP |  |  |  |
| Message broker | Mosquitto |  |  |  |
| Software tool |  |  |  |  |
| Container | Docker |  |  |  |
| Code Reference |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**4. Explain IoT software installation process (write used resource)**

**Step 1: Update and Upgrade the System**

First, the script updates the system package list and upgrades any outdated packages to ensure compatibility.

**Step 2: Install Essential Dependencies**

It installs necessary utilities such as curl, wget, and git, along with development tools like build-essential. It also installs Python, Node.js, OpenSSL for security, and firewall management tools.

For IoT applications, it installs mosquitto (an MQTT broker), docker.io, and docker-compose for containerized deployments.

**Step 3: Set Up the Mosquitto MQTT Broker**

The script enables and starts the Mosquitto service to ensure it runs on system startup.

**Step 4: Install Node-RED**

Node-RED, a flow-based programming tool for IoT automation, is installed globally using npm.

**Step 5: Install ThingsBoard**

The script downloads and installs ThingsBoard, an open-source IoT platform for managing devices and visualizing data. It then enables and starts the ThingsBoard service.

**Step 6: Install InfluxDB**

InfluxDB, a time-series database for storing IoT data, is installed by adding its official repository. The script enables and starts the database service.

**Step 7: Configure the Firewall**

The script opens key ports required for IoT communication:

MQTT (1883/tcp, 8883/tcp)

CoAP (5683/udp)

ThingsBoard Web UI (8080/tcp)

InfluxDB (8086/tcp)

Finally, it enables the firewall to enforce these rules.

**Step 8: Verify Installations**

It checks and displays the installed versions of Mosquitto, Node.js, npm, Python, Docker, and InfluxDB to confirm a successful installation.

**Final Step**

The script prints a completion message, indicating that the IoT software setup is finished and ready for use.

**This setup provides a fully functional IoT environment with an MQTT broker, an automation platform, a database, and security configurations.**

**5. Execute your process and explain (write used resource)**

# We can execute the installation on BashScript

#!/bin/bash

set -e # Exit on any error

# Step 1: Update and Upgrade the System

echo "Updating system packages..."

sudo apt update && sudo apt upgrade -y

# Step 2: Install Essential Dependencies

echo "Installing dependencies..."

sudo apt install -y curl wget git build-essential python3 python3-pip nodejs npm openssl ufw mosquitto mosquitto-clients docker.io docker-compose

# Step 3: Set Up the Mosquitto MQTT Broker

echo "Enabling Mosquitto service..."

sudo systemctl enable mosquitto

sudo systemctl start mosquitto

# Step 4: Install Node-RED

echo "Installing Node-RED..."

sudo npm install -g --unsafe-perm node-red

# Step 5: Install ThingsBoard

echo "Installing ThingsBoard..."

wget https://github.com/thingsboard/thingsboard/releases/download/v3.6/thingsboard-3.6.deb

sudo dpkg -i thingsboard-3.6.deb

sudo systemctl enable thingsboard

sudo systemctl start thingsboard

# Step 6: Install InfluxDB

echo "Installing InfluxDB..."

wget -qO- https://repos.influxdata.com/influxdb.key | sudo tee /usr/share/keyrings/influxdb-keyring.asc

source /etc/os-release

echo "deb [signed-by=/usr/share/keyrings/influxdb-keyring.asc] https://repos.influxdata.com/debian $(lsb\_release -cs) stable" | sudo tee /etc/apt/sources.list.d/influxdb.list

sudo apt update && sudo apt install -y influxdb

sudo systemctl enable influxdb

sudo systemctl start influxdb

# Step 7: Configure the Firewall

echo "Configuring firewall rules..."

sudo ufw allow 1883/tcp # MQTT

sudo ufw allow 8883/tcp # MQTT over TLS

sudo ufw allow 5683/udp # CoAP

sudo ufw allow 8080/tcp # ThingsBoard Web UI

sudo ufw allow 8086/tcp # InfluxDB

sudo ufw enable

# Step 8: Verify Installations

echo "Verifying installations..."

mosquitto -v

node -v

npm -v

python3 --version

docker --version

influxd version

# Final Step

echo "IoT setup is complete. Your environment is ready to use."