

# For Raspberry PI On-Premise IoT / Apache Kafka / TML Deployments:

Author: [Sebastian Maurice](#)

*Below are suggested configurations – some fields may differ or may not apply*

*Server environment:zookeeper.version=3.6.1--104dcb3e3fb464b30c5186d229e00af9f332524b, built on 04/21/2020 15:01 GMT*

*Server environment:java.version=1.8.0\_144*

**MAIN SITE: <https://github.com/smaurice101/raspberry>**

## 1. Install Java

- a. `sudo apt-get update`
- b. `sudo apt install default-jdk`

## 2. install TMUX: <https://linuxhint.com/install-tmux-ubuntu/>

- a. `sudo apt update`
- b. `sudo apt-get install tmux`
- c. `pkill -f tmux` (kills all tmux sessions)
- d. `tmux a -t <session name>`

## 3. Cpu monitoring:

- a. `sudo apt update`
- b. `sudo apt install -y htop`

## 4. Install MySQL:

- a. `Sudo apt update`
- b. `Sudo apt upgrade`
- c. `sudo apt install mariadb-server`
- d. `sudo mysql_secure_installation`

## 5. Install Python (follow steps a-j)

- a. `sudo apt-get install -y build-essential tk-dev libncurses5-dev libncursesw5-dev libreadline6-dev libdb5.3-dev libgdbm-dev libsqlite3-dev libssl-dev libbz2-dev libexpat1-dev liblzma-dev zlib1g-dev libffi-dev tar wget vim`
- b. `sudo mkdir Python`
- c. `sudo apt-get install libatlas-base-dev`
- d. `sudo chown pi:pi /home/pi/Python`
- e. `cd Python`
- f. `wget https://www.python.org/ftp/python/3.9.15/Python-3.9.15.tgz`

- g. sudo tar -zxvf Python-3.9.15.tgz
  - h. cd Python-3.9.15/
  - i. ./configure --enable-optimizations
  - j. sudo make altinstall
  - k. confirm install:
    - i. python -version
    - ii. IF WANT TO REMOVE PYTHON:
      - 1. sudo apt-get clean
      - 2. sudo apt-get autoremove --purge
      - 3. sudo apt-get remove python3.9
      - 4. sudo apt-get autoremove
6. install MAADSTML python library and other libraries
- a. pip install maadstml
  - b. pip install requests
  - c. pip install nest\_asyncio
  - d. pip install joblib
  - e. pip install asyncio
7. Install TML Technologies for ARM chipset If using Pi 3+, for PI 4 using ARM64 binaries: YOU KEEP ALL THESE IN USB stick
- a. <https://github.com/smaurice101/raspberrypi>
    - i. Download TML binaries
    - ii. Put each unzipped files in their folders:
      - 1. Sudo mkdir viper
      - 2. Sudo mkdir hpde
      - 3. Sudo mkdir viperviz
  - b. Copy viper-env-file from <https://github.com/smaurice101/raspberrypi/tree/main/viper-env-file>
    - i. Replace viper.env file with one above
      - 1. Copy/replace to Viper and Viperviz folder
  - c. IotSolution - copy all Python scripts from Github: <https://drive.google.com/drive/folders/1wJEuFLVtOzu8R-yYh6ybMASAAKkvMaTw?usp=sharing>
    - i. Sudo mkdir IotSolution
      - 1. produce-iot-customdata.py
      - 2. preprocess-iot-monitor-customdata.py
      - 3. preprocess2-iot-monitor-customdata.py
      - 4. Raw IoT Device Data: IoTData.zip and unzip data
      - 5. IoT Lat/Longs: downloafdsntmlidmain.csv
8. Start Apache Kafka: ZOOKEEPER (Store on USB stick)
- a. Sudo mkdir Kafka
  - b. Sudo chown pi:pi Kafka
  - c. Cd kafka\_2.13-3.0.0

- d. Download Kafka: `wget`  
[https://archive.apache.org/dist/kafka/3.0.0/kafka\\_2.13-3.0.0.tgz](https://archive.apache.org/dist/kafka/3.0.0/kafka_2.13-3.0.0.tgz)
- e. `tar xzf kafka_2.13-3.0.0.tgz`
- f. `export KAFKA_HEAP_OPTS="-Xmx512M -Xms512M"`
- g. Edit `zookeeper/conf/zoo.cfg`
  - i. `tickTime=2000`
  - `initLimit=10`
  - `syncLimit=5`
  - `dataDir=/media/pi/sebusb/zookeeper # change to your`
  - `/mnt/usb`
  - `clientPort=2181`
- h. `PATH="$PATH:/home/pi/Kafka/kafka_2.13-3.0.0/bin"`
- i. `cd bin`
- j. Enter: `zookeeper-server-start.sh`  
`/home/pi/Kafka/kafka_2.13-`  
`3.0.0/config/zookeeper.properties <enter>`

#### 9. Start Kafka in another terminal

- a. Kill port: `sudo kill -9 $(sudo lsof -t -i:3000)`
- b. `export KAFKA_HEAP_OPTS="-Xmx512M -Xms512M"`
- c. `./kafka-server-start.sh ../config/server.properties`

#### 10. To SSH in to raspberry pi

- a. Use Raspberry Pi imager and flash OS
  - i. <https://www.raspberrypi.com/software/>
- b. Click setting and enable SSH and Wifi
- c. To manually enable wifi/ssh follow blog here:
  - i. <https://roboticsbackend.com/enable-ssh-on-raspberry-pi-raspbian/>

#### 11. Mount USB

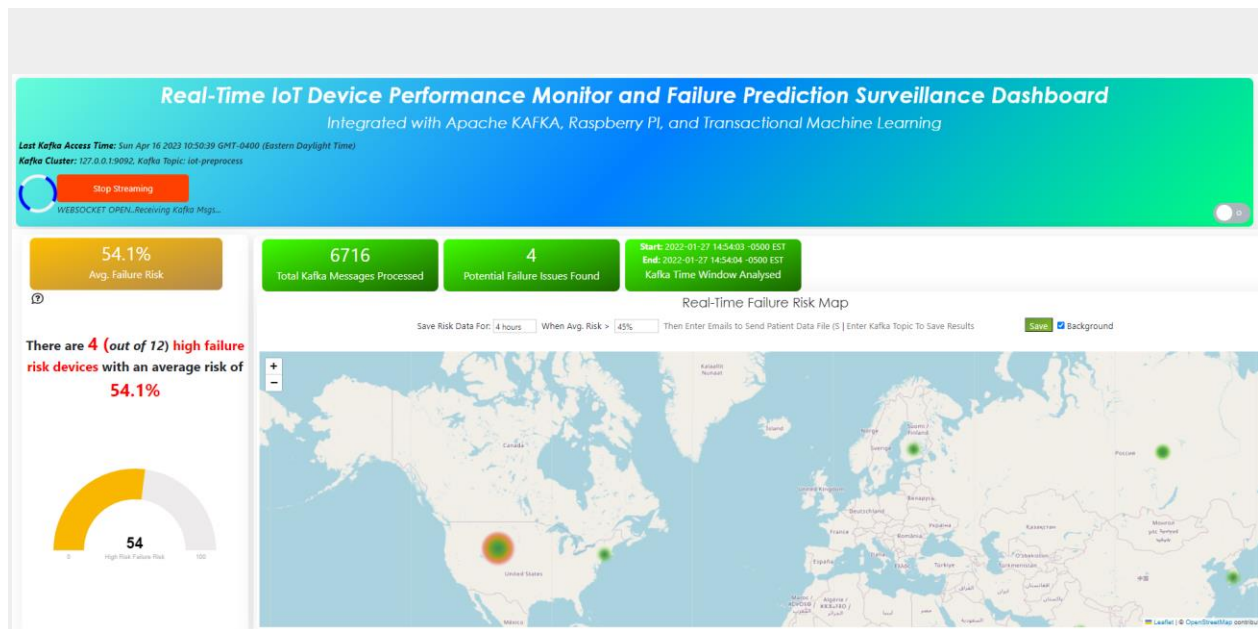
- a. Type: `sudo ls -l /dev/disk/by-uuid/`
- b. Capture uuid i.e. 61AA-D040 (for /sda1 which is usb)

```
total 0
lrwxrwxrwx 1 root root 15 Feb 20 23:08 37CA-39EC -> ../../mmcblk0p1
lrwxrwxrwx 1 root root 10 Feb 20 23:08 61AA-D040 -> ../../sda1
lrwxrwxrwx 1 root root 15 Feb 20 23:08 a4af13c6-d165-4cbd-a9f6-c961fef8255d -> .
c. ../../mmcblk0p2
```

- d. Create mount folder: `sudo mkdir /mnt/usb`
- e. Auto mount usb:
- f. Open file: `sudo nano /etc/fstab`
- g. Add line at the end of /etc/fstab:
  - i. `UUID=61AA-D040 /mnt/usb vfat uid=pi,gid=pi 0 0`
  - ii. Save and exit
  - iii. Reboot: `sudo reboot`

## To Execute the IoT Solution

12. Cd to /mnt/usb/tmux
13. Run: ./tmux.sh
  - a. Note you may need to edit
14. VISUALIZATION URL: Make sure to change IP address to the one given to your Raspberry PI:
  - a. <http://192.168.2.27:9005/iot-failure-seneca.html?topic=iot-preprocess2,iot-preprocess&offset=-1&groupid=&rollbackoffset=500&topictype=prediction&append=0&secure=0>
  - b. You should see a dashboard similar to this:



15. Increase swap file
  - a. `sudo nano /etc/dphys-swapfile`

- b. `CONF_SWAPSIZE=2000`
- c. `sudo reboot`
- d.** `free -m`