

Configuration Manual

MSc Research Project
MSc Cybersecurity

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MSc Project Submission Sheet
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Configuration Manual

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1. Introduction

The setup handbook briefly describes the hardware and software requirements for the research project's implementation. Simple java JDK code, AWS Greengrass, and the proper usage of the Raspberry Pi 4 in the creation of the research project are also detailed in the Configuration manual: "*The significance of IoT security and privacy in preventing cyberattacks.*"

2. System Configuration

2.1 Hardware Requirement

For the project's implementation, a system with the following hardware specifications was employed.

1. **Processor:** AMD Ryzen 7 3700U with Radeon Vega Mobile Gfx
2. **Memory:** 12 GB
3. **Operating System:** Kali Linux
4. **GPU:** AMD Radeon™ RX Vega 10 Graphics
5. **Wireless card:** Qualcomm Atheros QCA9377 Wireless Network Adapter
6. **Storage:** SSD/EMMC 1 476 GB,KING

2.2 Software Requirement

In order to complete the research study, the following software was employed.

1. **AWS services:** Total access to Aws services, containing security and encoding keys, approval, and identification, was granted via an AWS premium account.
2. **AWS Greengrass Core:** The AWS Greengrass core has been used to construct a collection that included both the primary sensor and all additional Internet of Things endpoints that will link to the edge.
3. **AWS IAM:** The AWS Identity and Access Management web service (IAM) from the AWS available reserves were used in this approach. Every individual has their own IAM profile to govern their privileges.

4. **Raspberry PI 4:** By providing External and internal links in Linux security aspects, the Raspberry Pi was set to establish an interface among the Raspberry Pi and AWS.

3. Project Development

For the full implementation of the IoT suggested cloud-edge concept, AWS Greengrass Core, Raspberry PI 4 and JAVA JDK were utilised. Private and public key certificates, authentication, secure communication, and data transmission are all part of the implementation.

3.1 AWS Working Environment

Each system that uses AWS will need to be validated using a certificate. To ensure secure communication between the edge and AWS, I created private and public key credentials. As seen in Figure 1, AWS generated the core certificates once we joined the Greengrass group. After uploading the produced files to the Raspberry Pi, we started the Greengrass Core.

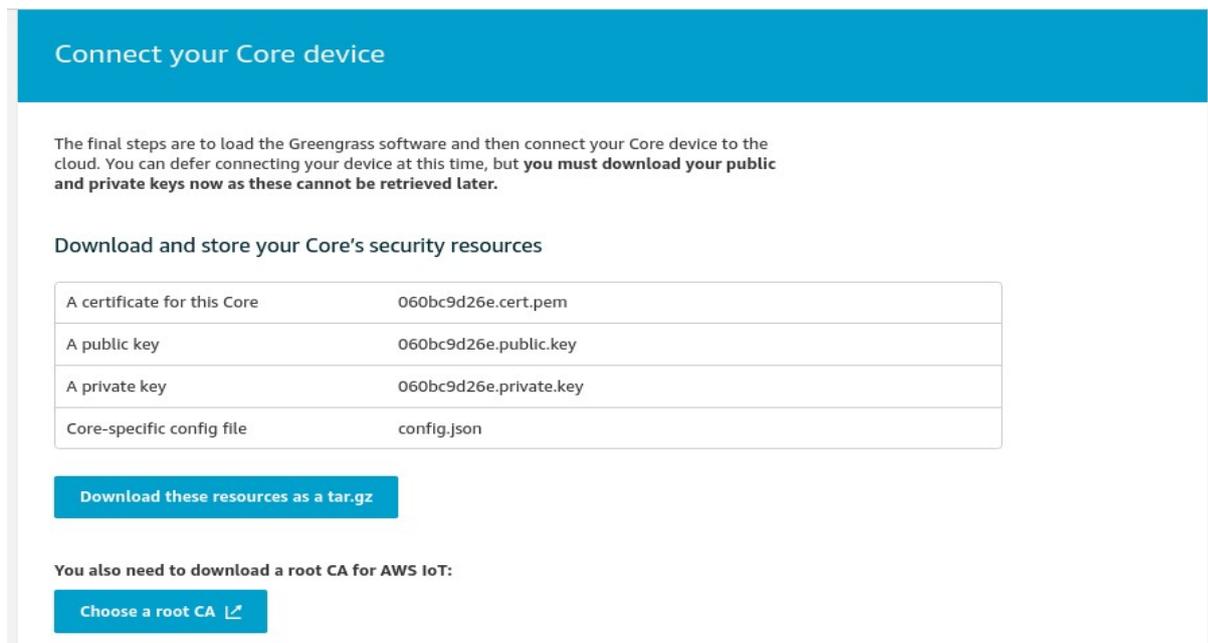


Figure 1. Keys and Certificate

- In a general sense, AWS IoT Core links IoT devices to one another and to the cloud.
- For each device, a CA Core credential, a certificate, and a secret key are required (this is the AWS IoT certificate). CA Root certificates come in a variety of shapes and sizes, depending on the type of IoT device.
- A policy is required for each device, which determines which actions it is allowed to do (for example, connect/receive/publish/subscribe).

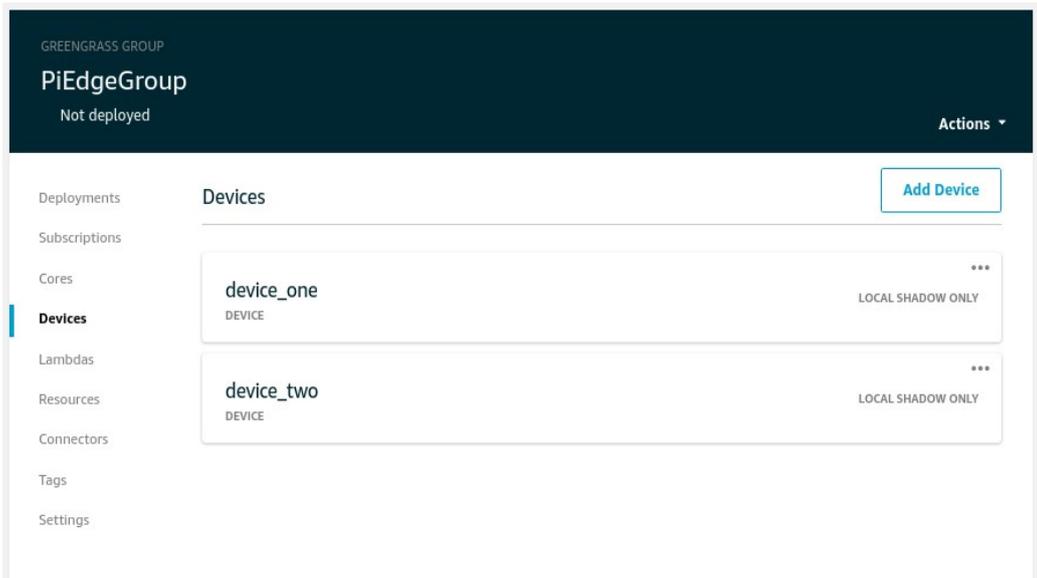


Figure 2. IoT-enabled device

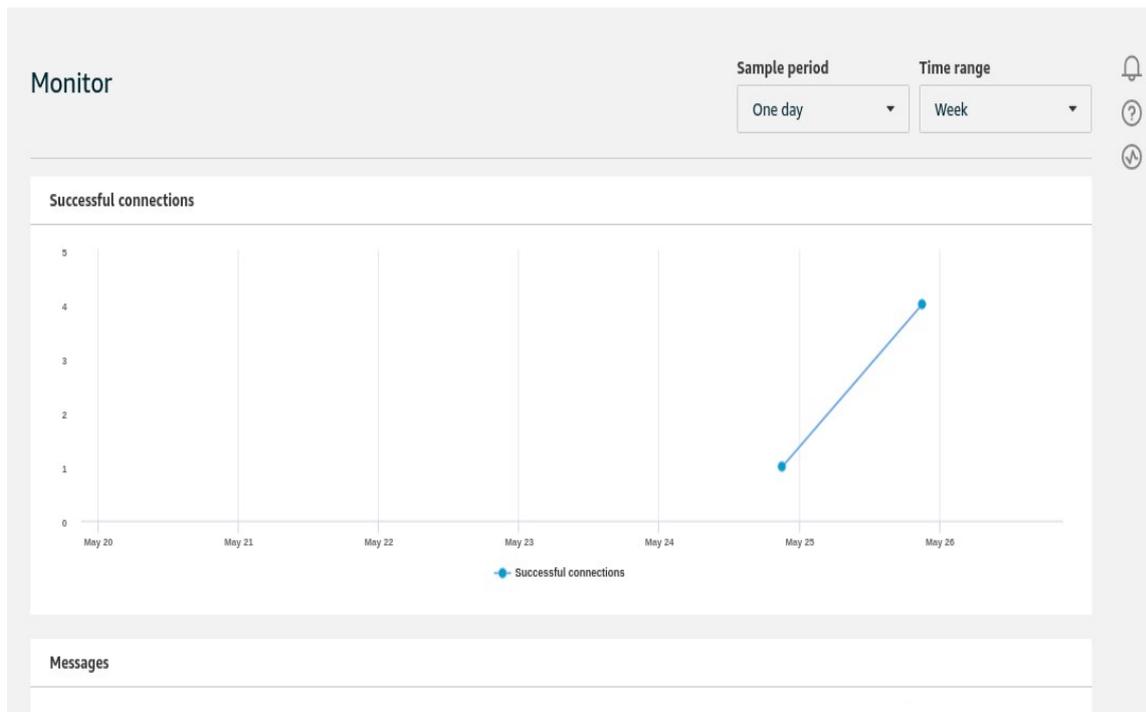


Figure 3. Successful, secure communication

3.2 Raspberry Pi 4 setup

An MQTT Aspect is used to interact amongst MQTT clients, and AWS IoT devices are mimicked as MQTT clients (if it is virtual—as it is in this case—). The connection may be viewed as a safe route for communication between clients that has been established, subscribed to, and utilised by other clients to send messages. The Raspberry Pi setup method now Obtaining Java JDK8, Greengrass resources, and a compatible Core programme (based on the device—in our instance, a Raspberry Pi 4) are all part of the process.

As shown in Figure 4, those kinds of data were moved to the Raspberry Pi 4.



```
maisat@maisat-Inspiron-3537:~/Downloads$ scp greengrass-linux-armv7l-1.10.1.tar.gz pi@192.168.8.139:/home/pi
pi@192.168.8.139's password:
greengrass-linux-armv7l-1.10.1.tar.gz      100% 33MB  3.6MB/s  00:09
maisat@maisat-Inspiron-3537:~/Downloads$ scp 060bc9d26e-setup.tar.gz pi@192.168.8.139:/home/pi
pi@192.168.8.139's password:
060bc9d26e-setup.tar.gz                  100% 2842  23.2KB/s  00:00
maisat@maisat-Inspiron-3537:~/Downloads$
```

Figure 4. Raspberry Pi 4 setup

3.3 Greengrass on Raspberry Pi 4

After transferring the certificates and keys to the Raspberry Pi 4, all essential files were extracted, and various configuration files were changed to correspond to the newly produced certificates and keys. The Greengrass core gadget was finally turned on. As can be seen in figure 5, the raspberry gadget worked well as an Edge.



```
pi@raspberrypi:/greengrass/ggc/core $ sudo ./greengrassd start
Setting up greengrass daemon
Validating hardlink/softlink protection
Waiting for up to 1m10s for Daemon to start

Greengrass successfully started with PID: 1916
pi@raspberrypi:/greengrass/ggc/core $
```

Figure 5. Greengrass was successfully installed on the Raspberry Pi 4 kit.

4. References

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