Advantech UNO-238 V2 Getting Started Guide for AWS IoT Greengrass

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1 Document Information

1.1 Revision History

DATE	VERSION	DESCRIPTION
2024/03	1.0	Initial Version

2 Overview

Advantech's new UNO-200 series focuses on IT level applications, which only require semiindustrial design and cost efficiency. New UNO-238 V2 model aims to provide an optimized design with the 12th generation CPU Intel® Core™ Alder Lake P-Series processor. It is IT-oriented, fanless, with IoT edge computing features and sufficient connectivity including 2 x LAN, 2 x RS-232/422/485, 1 x GPIO, 4 x USB 3.2, 2 x USN Type-C 1 x DP 1.4, 1 x HDMI 2.0 and 1 x CANBus. It also supports 3 x M.2 B/E/M Key and 1x Nano SIM card slot for expansion to fulfill various requirements for industrial applications. Advantech UNO-238 V2 is qualified to support the Amazon SageMaker Neo DLR and TensorFlow Lite frameworks to perform ML inference at the edge with AWS IoT Greengrass on locally generated data using cloud-trained models.

2.1 About AWS IoT Greengrass

To learn more about AWS IoT Greengrass, see how it works and what's new.

3 Hardware Description

3.1 Datasheet UNO-238 V2 Datasheet

3.2 Standard Kit Contents

The standard shipping hardware package includes UNO-238 V2 hardware configuration. Advantech also offers optional accessories to choose from, including adapters and power cables, mount kits, miscellaneous, WIFI module, LTE module and antenna. Please refer to the Datasheet for more detailed offerings: <u>UNO-238 V2 Datasheet</u>

& UNO-238 V2 User Manual & Startup Manual

- 3.3 User provided items Not Applicable
- 3.4 3rd party purchasable items Not Applicable
- 3.5 Additional Hardware References

For more information, please refers to the link below: UNO-238 V2 Datasheet

4 Set up your development environment

4.1 Tools installation (IDEs, Toolchains, SDKs)

As an Industrial PC, the development environment for this device should be determined by the user based on its intended use

5 Set up your hardware

This section provides instructions for setting up the platform's hardware. The link is to the user manual of UNO-238 V2, <u>UNO-238 V2 User Manual & Startup Manual</u>, which includes the following information:

- Introduction to UNO-200 Series and Specifications for UNO-238 V2
 - o Safety precaution
 - o Packing list
 - Hardware specification
 - o Dimensions
- Hardware functionality
 - o Internal connectors
 - External I/O connectors
 - Expansion kit's internal connects
- Initial Setup
 - o Chassis grounding
 - o Connecting power
 - o Opening and closing the bottom cover
 - o Installing second stack extension kit
- Appendix of system settings and pin assignments

6 Setup your AWS account and Permissions

Advantech supports AWS IoT Greengrass Core software for UNO-238 V2 by offering a wrapping package. This package helps customer to create necessary resources for AWS IoT Greengrass Core software.

Create an AWS IAM user and attach AWS managed policy, named "IAMFullAccess" (ARN: "arn:aws:iam::aws:policy/IAMFullAccess). Create access key and download it. It's a .csv file which contains access key ID and secret access key of your IAM user. Back up it before using it with Advantech wrapping package. Also, to employ the principle of least privilege in the production environments. You may reference this AWS resource: https://docs.aws.amazon.com/IAM/latest/UserGuide/best-practices.html#grant-least-privilege

Refer to the online AWS documentation at <u>Set up your AWS Account</u>. Following steps outlined in the sections below will show how to create your account and a user and get started:

- Sign up for an AWS account
- <u>Create a user and grant permissions</u>
- Open the AWS IoT console

7 Create Resources in AWS IoT

Advantech wrapping package helps customer to create resources in AWS IoT. Initialization script can assist user to create resource by IAM user access key file.

Refer to the online AWS documentation at <u>Create AWS IoT Resources</u>. The following steps outlined in these sections will show how to provision resources for your device:

- <u>Create an AWS IoT Policy</u>
- <u>Create a thing object</u>

Pay special attention to the Notes.

8 Install the AWS Command Line Interface

Advantech wrapping package installs AWS command line interface (v2.9.13) before initializing AWS IoT Greengrass Core software. Please refer to the following for more information.

To install the AWS CLI on your host machine, refer to the instructions at <u>Installing the AWS CLI</u> <u>v2</u>. Installing the CLI is needed to complete the instructions in this guide.

Once you have installed AWS CLI, configure it as per the instructions in this <u>online guide</u>. Set the appropriate values for Access key ID, Secret access key, and AWS Region. You can set Output format to "json" if you prefer.

9 Pre-requisites of Linux System

To facilitate installation of AWS IoT Greengrass Core software for user with UNO-238 V2, wrapping package for AWS IoT Greengrass Core software is supported by Advantech. These scripts inside the wrapping package require Ubuntu-based distribution.

10 Install and Initialize AWS IoT Greengrass

Instructions in this section explain how to use package wrapped by Advantech to install and initialize AWS IoT Greengrass Core software. Within files downloaded from Advantech, there is a file named "greengrassv2_linux-amd64.tar.gz". Follow instructions below to install and initialize AWS IoT Greengrass in UNO-238 V2. For the package details and document for downloading, please refer to <u>Technical Download and Support</u>

10.1 Install with the Wrapped package

STEP 1. Extract the wrapping package first \$ tar xf greengrassv2_linux-amd64.tar.gz

STEP 2. Enter the extracted folder and run script with root privilege. (This script installs necessary programs and setup environment for AWS Greengrass.)

\$ sudo ./installer.sh

NOTE: verify availability of Java here with command: \$ java –version e.g. Java 1.8.0_342

NOTE: The installer.sh supported by Advantech installs software package for customer, e.g., openjdk-8-jre, so the version verification command must be run after installer.sh

10.2 Configure AWS IoT Greengrass Core software wrapped by Advantech: with initial.config

Edit the config file and input preferred configuration. Reference table below about definition of each configuration variable (path: /opt/greengrassv2/config/initial.config). Because this file requires root privilege to access, launching editor with sudo command is recommended.

STEP 3. Edit the config file

\$ sudo vim /opt/greengrassv2/config/initial.config

NOTE: Because AWS IoT Greengrass can be configured to run in a Docker container, the wrapping package defines configurable running mode of AWS IoT Greengrass Core software: native mode and Docker mode. Users need to select one of them in config file of wrapping package before initialization.

Reference links below for detailed information about AWS Greengrass V2 Core. These links can help you to select running mode of your device and help you know more about how to setup a Greengrass Core device well.

- AWS Greengrass V2 developer guide : Walks through how to set up AWS IoT Greengrass V2 and integrate it with other services.
- Run AWS IoT Greengrass Core software in a Docker container : This link is also part of developer guide. If you want to know detail information of initialization and launch Greengrass V2 inside Docker container, reference this link.

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#config for initialization

#RUNNING MODE of Greengrass V2 Core
#value 0: native mode, value 1: docker mode
CONFIG_GREENGRASSV2_RUNNING_MODE=0

CONFIG_GREENGRASSV2_REGION=ap-northeast-1 CONFIG_GREENGRASSV2_THING_NAME=GreengrassCore-sampleS1 CONFIG_GREENGRASSV2_THING_GROUP_NAME=GreengrassGroup-S1

Variable	Value
CONFIG_GREENGRASSV2_RUNNING_MODE	0 for native mode, 1 for Docker mode
CONFIG_GREENGRASSV2_REGION	Region configuration for core device
CONFIG_GREENGRASSV2_THING_NAME	Thing name of core device
CONFIG_GREENGRASSV2_THING_GROUP_NAME	Thing group of core device

10.3 Initialize AWS IoT Greengrass

Make sure user secure credential file(.csv) is ready before next instruction. (Please refer to Section 5: Set up Your AWS account and permissions). Backup the secure credentials file before execution of following command because the initialization script remove .csv file after successful initialization.

STEP 4. Run initialization script prepared in the wrapping package

\$ sudo /opt/greengrassv2/tools/greengrassv2_initializer.sh <path of user secure credentials>

After execution of this initialization script, AWS IoT Greengrass Core software will be launched with configuration and secure credentials offered by user.

10.4 Confirm Result of Initialization

To confirm initialization result, read log printed by greengrassv2_initializer.sh. **In native mode**, last line printed by greengrassv2_initializer.sh is "Native Greengrass V2 initialized".



In Docker mode, greengrassv2_initializer.sh prints "Docker container Greengrass V2 initialized." to report success of initialization. While initializing, the script prints several dots to tell user how many seconds spent on waiting initialization. If it's timeout after 180 seconds, error message is reported with red logs. The following picture is captured with successful initialization of Docker mode.



The initialize script can detect initialized Greengrass V2 and confirm for overwrite if new initialization is launched. Answer "n" to stop initialize process to backup anything you need, and run the initialize script again with answer "y" to start a new initialization.



10.5 Resolve Error Log Found with Initialization: Timeout in Docker Mode

In **Docker mode**, the initialize script spends 180 seconds on waiting for initialization progress, including device certification and device configuration. The initialization progress would fail with any invalid environment, e.g., an invalid IAM access key file.

As the picture below, the initialize script prints "Processing" and dots while spending 180 seconds on waiting. And the red text in picture tells that it's timeout and users have to check Greengrass log to get detail information of initialization failure. ("/greengrass/v2/logs/greengrass.log")

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advantech@UNO-1372G-E3AE:~\$ sudo /opt/greengrassv2/tools/greengrassv2_initializer.sh ./invaliduser.csv	
Start to initialize Greengrass Core V2.	
Loaded image: amazon/aws-iot-greengrass:2.4.0-0	
Going to initialize Greengrass Core V2 Docker mode. You'll see "Processing" and several dots while initializing Initialization would timeout after 180 seconds.	
Starting initgreengrass done	
Initialize of Docker mode timeout. Please check greengrass log and your environment.	

11 Create a Hello World component

In Greengrass v2, components can be created on the edge device and uploaded to the cloud, or vice versa.

11.1 Create the component on your edge device

Follow the instructions online under the section <u>To create a Hello World component</u> to create, deploy, test, update and manage a simple component on your device.

11.2 Upload the Hello World component

Follow the instructions online at <u>Upload your component</u> to upload your component to the cloud, where it can be deployed to other devices as needed.

11.3 Deploy your component

Follow the instructions online at <u>Deploy your component</u> to deploy and verify that your component is running.

12. Troubleshooting

For more information, please refer to

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Related Section	Link
User Manual	UNO-238 V2 User Manual & Startup Manual
Advantech FAQs	Technical Download and Support
AWS IoT Greengrass	AWS IoT Gressgrass Troubleshooting

Also, it is welcome to provide troubleshooting tips for resolving common or potential problems with your device/software/application, <u>UNO-238 V2 Service Request - Advantech</u>