Deploy AWS IoT Greengrass on IoT Gateway

Now that we have setup all the required resources in AWS account on cloud, we can prepare package to install AWS IoT Greengrass core software with AWS IoT fleet provisioning.

To prepare package, all the steps are part of this <u>script</u>. You can execute this script on IoT device gateway or your computer. Please make sure that you have installed <u>AWS CLI</u> v2 with access to your AWS account.

For this use case, I execute on my laptop to create package in build directory. You can then copy package on your IoT gateway (e.g., Raspberry Pi). The script performs below steps.

- Create build directory mkdir build && cd build
- 2. Download AWS CA
- 3. Download claim certificates from AWS Secrets Manager
- 4. Download AWS IoT Greengrass and fleeting provisioning plugin
- 5. Get the endpoints and fleet provisioning template for AWS IoT Core
- 6. Prepare config.yml.
- 7. Prepare Greengrass start up command.
- 8. Change execution permission.

Test the Solution

As we have configured Raspberry Pi with AWS IoT Greengrass core software along with automatic fleet provision configuration, let us now run AWS IoT Greengrass service.

Test AWS IoT Greengrass device provisioning

1. Connect (ssh) to IoT Device gateway (e.g., Raspberry Pi) command line terminal and run below command to start AWS IoT Greengrass service to auto provision authenticate and establish connection to AWS IoT Core.

sudo build/fleet_provision.sh

 On AWS IoT Core Console, expand the Greengrass section from the left panel and choose Core Devices option to verify the state of device. The device status should appear healthy as below.

AWS IoT \times	·€	$(\begin{array}{c} \\ \\ \\ \end{array}) \rightarrow (\begin{array}{c} \\ \end{array})))) $	
Monitor	0	ψ	
Activity	Greengrass core device	Deploy software components to core	Connect client devices to core devices
► Connect	A Greengrass core device runs Greengrass Core software. It is an edge device, or a controller for	devices After you set up a core device or group of core	Set up client devices to connect to and communicate with core devices over MQTT.
Manage	your edge devices. Greengrass core devices are things in AWS IoT. You can group core devices	devices, you can deploy software components to them. View the deployments page to create or	Configure discovery
Fleet Hub	together to deploy configurations to them using AWS IoT thing groups. Manage thing groups 🖄	revise a deployment and configure the software to deploy.	
▼ Greengrass	Est un sur sur deuter	View deployments	
Getting started	Set up one core device	view deproyments	
Core devices			
Components	Greengrass core devices (1)		C Set up one core device
Deployments			
Classic (V1)	Q Search by core device name		< 1 > @
Wireless connectivity	Name \bigtriangledown State	IS 🗸	Status reported ∇
Secure	DemoWasteBin 📀 H	ealthy	3 days ago
b. Defeed			

3. If device does not appear as healthy, then please check Greengrass service log for any errors under /greengrass/v2/logs folder and follow <u>troubleshooting documentation</u>.

Test remote application deployment

 Under Greengrass section, choose Component option for edge application deployment and it should show private custom component as below. This custom component is already hosted in Amazon S3 repository along with CloudFormation script and made ready for deployment. However, for reference purpose, it is available on <u>GitHub</u>. To deploy this application, please choose **monitor_wastebin_app**. Refer the procedures in the diagram below.

► Secure		monitor_wastebin_app	2.0.0		linux	All	3 days ago
Wireless connectivity		Name	♥ Versio	n 🗢 (Operating systems □ ▽	Architectures	✓ Version created
 Classic (V1) 		Q. Find by name, operating system, or architecture					< 1 > ©
Core devices Components		My components (1) Your components are private components	ents that only you can se	e and deploy to core devices. Lea	rn more 🗹	[C Create component
 Greengrass Getting started 		My components Public co	mponents Con	munity components			
Manage						Create comp	ponent
Monitor Activity Connect		Greengrass components are soft that run on Greengrass core devi can represent applications, runti libraries, or any other code that y device.	ware modules ices. Components me installers, you run on a	You can develop and test a local core device. Greer public components that i local development tools, as machine learning. Lea	t custom components on ngrass also provides include common libraries, and core features, such rn more	When you finish component, you Then, you can do your Greengrass	developing the software for your can register it with Greengrass. eploy and run the component on core devices.
AWS IoT	×	Overview		Step 1: Develop a cor	nponent	Step 2: Create	your component in the

2. Verify details version 2.0.0 and choose deploy button.

AWS IoT $\qquad \times$	AWS IoT 🗦 Greengrass 🗦 Comp	onents > monitor_wastebin_app:2.0.0		
Monitor Activity	monitor_wastebin	_app Version: 2.0.0	Create version Delete ver	rsion View recipe Deploy
▶ Connect	Overview			
▶ Manage	Description			
▶ Fleet Hub	Uses stream manager to upload a	file to an S3 bucket.		
Greengrass	Version	Version created	Status	Component scope
Getting started	2.0.0	3 days ago	O Deployable	Private
Core devices	Туре	ARN	Publisher	
Components	aws.greengrass.generic	arn:aws:greengrass:eu-	sbmane@amazon.com	
Deployments		west-1:592092194010:components		
 Classic (V1) 		:monitor_wastebin_app:versions:2.0 .0		
Wireless connectivity				

3. On deployment stage, select create new deployment option

Add to deployment	×
Deployment O Add to existing deployment	Create new deployment
	Cancel Next

- 4. On specify target page, select core device as target and enter the name of core device from step 2 in section Test Greengrass device provisioning. For the rest of fields, follow the instruction on page
- 5. On select component page, please select below components (My components and public components) as shown screen shot

AWS IoT $\qquad \times$	AWS IoT > Greengrass > Deploy	yments > Create deployment	
Monitor	Step 1 Specify target	Select components	
Connect	Step 2 Select components	Select the components to deploy. The deployment includes the dependencies for each component that you select parameters of selected components in the next step.	You can edit the version and
▼ Manage		My components (1/1)	
Overview	Step 3 - optional		colorial components
Things	Configure components	G Fina by name	selected components
Types	Step 4 - optional		
Thing groups	Configure advanced settings	Name [2]	~
Billing groups			
Jobs	Step 5	monitor_wastebin_app	
Job templates	Review		
Tunnels		Public components (3/44)	
Retained messages		O Find hu name	colorted components
Fleet metrics new			
Fleet Hub		Name [7]	▽
▼ Greengrass			
Getting started		aws.greengrass.StreamManager	
Core devices		aws.greengrass.TokenExchangeService	
Components			
Deployments		aws.greengrass.Nucleus	
Classic (V1)			
Wireless connectivity		Cancel	Previous Next

6. Finally check component configuration and select **Next** button. Then on **Configure advanced settings section**, only choose Next button and move to Review stage. On Review stage, choose deploy button to finish deployment.

AWS IoT \times	AWS IoT > Greengrass > Deployments > Create deployment			
Monitor Activity	Step 1 Specify target Step 2	Configure components – optional You can configure the version and configuration parameters of each component to deploy. Comp that you can customize in this deployment.	onents define default configuration parameters	
Connect Manage Overview Things	Select components Step 3 - optional Configure components	Selected components (4) Q. Find by name	Configure component	
Types Thing groups	Step 4 - optional Configure advanced settings	Name 🖸 🗢 Version	♥ Modified? ♥	
Billing groups Jobs Job templates	Step 5 Review	aws.greengrass.StreamManager 2.0.14 aws.greengrass.TokenExchangeService 2.0.3		
Tunnels Retained messages Fleet metrics new		aws.greengrass.Nucleus 2.5.3	•	
Fleet Hub			Cancel Previous Next	

7. Please note that if you are redeploying same component, then please select modified component and select "Configure component" button in the top right corner. Then in the "Configuration to merge" section as shown in screen shot, please enter some text e.g., "deployment7"

Previous configuration	Configuration update
Revision or default configuration Revision: 8	Reset paths A list of JSON pointers that define which configuration value value, the deployment removes that value from the configura
Configuration update	merges the values in the configuration to merge. Specify a sidefault values. Learn more
<pre>{ "reset": [], "merge": { "Message": "deployment7" } }</pre>	L J Configuration to merge The configuration to merge with the configuration on each configuration on each configuration is the values that you specify in the list of reset p
	1 ▼ { 2 "Message": "deployment7" 3 }

- 8. Now that application component deployment is completed, check the Greengrass logs on Raspberry Pi to verify the deployed application is not terminated because of any errors like permission issue etc.
 - a. **Troubleshoot** : If you observe greengrass service failed to download the custom component artifacts from the Amazon S3 bucket because device name, certificate path cannot be empty, then stop and start greengrass service as below and repeat 1 to 6 steps again to redeploy application.

sudo systemctl stop greengrass.service sudo systemctl start greengrass.service

9. On AWS IoT Greengrass console, deployment should appear as completed

AWS IoT $\qquad \times$	000		000
Monitor	Create a continuous deployment to your	Revise and copy deployments	Cancel a deployment
Activity	Contra a new deployment or start from an	You can revise a deployment for a target or copy a	Cancel a deployment to stop deployments to
▶ Connect	existing one, to configure the components to	deployment to a new target. Targets are individual core devices or groups of core devices.	remaining target devices. Then, you can revise the deployment and start it again.
Manage	deploy to core devices. When you add a new core device to a thing group, AWS IoT Greengrass	Each target can have one deployment at a time.	
Fleet Hub	automatically deploys the latest configuration for that device. Learn more		
▼ Greengrass			
Getting started			
Core devices	Deployments (2)	C Copy to new	target Revise Cancel Create
Components	Q Find by deployment name or target name		< 1 > ©
Deployments			
Classic (V1)	□ Deployment	name 🗢 Target type 🗢	Status V Deployment created V
Wireless connectivity	Deployment for smart bin MyGree	ngrassCoreGroup Thing group	Active 2 months ago
Secure	Deployment for smart waste bin DemoW	asteBin Core device	⊘ Completed 3 days ago