

# **Enhancing Edge Computing with Dell NativeEdge and AWS IoT Greengrass**

## White Paper

**H04557**

### **Abstract**

In the rapidly evolving landscape of edge computing, the integration of Dell NativeEdge and AWS IoT Greengrass presents a compelling solution for businesses seeking to optimize their edge operations.

## Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

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# Enhancing Edge Computing with Dell NativeEdge and AWS IoT Greengrass

## Introduction

Dell NativeEdge, AWS IoT Greengrass, and Amazon SageMaker form a powerful combination of complementary technology for edge computing and AI inferencing. Here is a breakdown of how they work together to deliver a robust edge-to-cloud AI solution:

- Dell NativeEdge—Streamline edge operations with secure, zero-touch device onboarding, high availability, efficient deployment and management of infrastructure and applications.
- AWS IoT Greengrass—Enables seamless connectivity between edge devices and the AWS cloud while supporting local processing. Its integration with AWS's extensive service catalog, including AI/ML workload and Lambda-based applications, allows for efficient data handling and real-time decision-making at the edge.
- Amazon SageMaker—Facilitates advanced machine learning model development, training, and optimization. It enables organizations to build and deploy AI models at the edge and cloud for inferencing and quick insights.

Together, these technologies create a complete, secure, scalable, and cost-effective ecosystem for edge AI. NativeEdge ensures robust infrastructure, Greengrass handles local processing and cloud integration, and SageMaker powers sophisticated ML models. This triad enables real-time, AI-driven insights with minimal latency, unlocking significant value for organizations across industries.

With Dell NativeEdge, customers can accelerate AWS Greengrass IoT deployments and reduce costs. NativeEdge Endpoints can be shipped directly to the desired location and onboarded securely without IT intervention. The Greengrass core software can be centrally installed and deployed on a VM onto a NativeEdge endpoint using AWS IoT Greengrass blueprint. That allows seamless operation of a combination of AWS services, DIY applications, VMs, and containers. Also, AWS SageMaker and SageMaker Neo enhances this solution by enabling advanced machine learning model development, training, and optimization. By delivering robust AI outcomes and low-latency insights for real-time decision-making at the edge.

Without Dell NativeEdge, customers must contend with significant complexity, logistics, and ongoing operational costs that are associated with maintaining a fleet of geographically dispersed edge devices. Dell NativeEdge simplifies, secures, and accelerates the deployment and management of AWS Greengrass services, making the process more efficient and cost-effective.

## Revision history

The following table lists the revision history of this document.

**Table 1. Revision history**

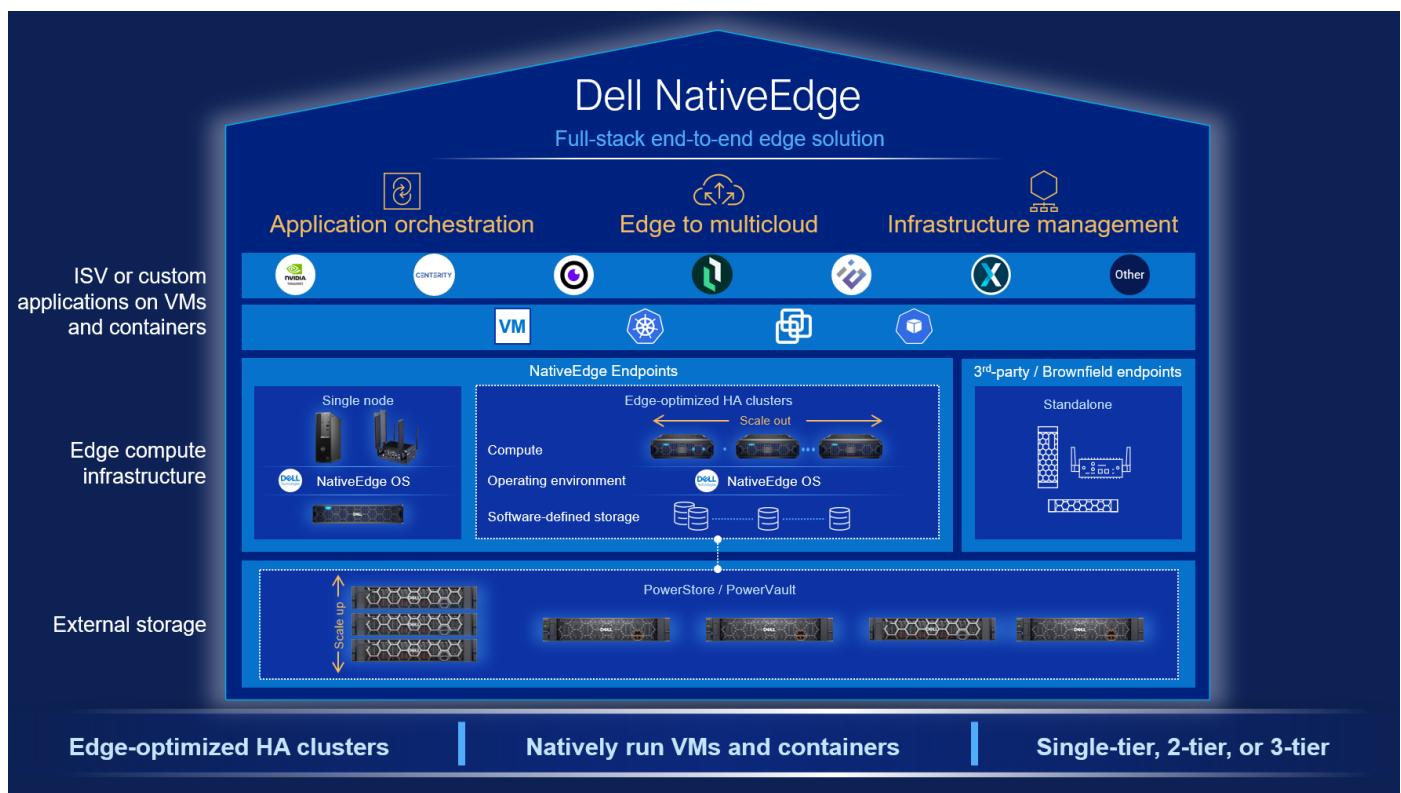
Revision	Date	Change description
H04557	Aug 2025	Initial release.

# NativeEdge overview

Dell NativeEdge centralizes the deployment and management of edge infrastructure and applications using blueprint-driven automation. Key features include:

- Zero-touch provisioning—Deploy endpoints without manual intervention, ensuring rapid and secure setup.
- NativeEdge blueprints—Use declarative YAML-based templates to automate the deployment and orchestration of edge applications, infrastructure, and services.
- High availability options—Ensure service continuity with automated VM failover, data redundancy, and load balancing through clustered NativeEdge endpoints.
- Application orchestration—Automate deployment at scale using flexible blueprints for VMs and containers.
- Zero-trust security—Implement robust security measures based on NIST, CISA, and DoD standards.
- Integration capabilities—Seamlessly integrate with existing Kubernetes and vSphere clusters.

Dell NativeEdge provides a scalable, secure, and efficient platform for edge computing, transforming data processing and driving innovation in IoT applications. By leveraging these capabilities, organizations can enhance their operational efficiency and unlock new possibilities in the realm of IoT.



**Figure 1. NativeEdge architecture**

# AWS IoT Greengrass

AWS IoT Greengrass extends AWS IoT capabilities to the edge, enabling local processing, analysis, and action on data generated by connected devices. Key features include:

- Local processing—It runs AWS Lambda functions on edge devices for real-time data analysis and decision-making. Lambda is popular with many customers for edge use cases because of its low overhead.
- Machine learning support—Deploy and run machine learning models directly on edge devices. Customers can select from a catalog of pretrained models and easily deploy them to the edge through the AWS console.
- Integration with AWS services—Connects with other AWS services for enhanced functionality.
- Managed service—Simplify software deployment, management, and monitoring of edge applications.
- Security features—Ensure encryption, authentication, and access control for secure edge operations.
- Bandwidth efficiency—Reduce cloud data transmission by processing relevant data locally.

AWS IoT Greengrass provides a powerful platform for building intelligent edge devices that can analyze data, detect anomalies, and act in real-time. By extending AWS IoT to the edge, it enables faster, more secure, and efficient data processing, making it ideal for applications such as industrial automation, smart cities, and transportation systems.

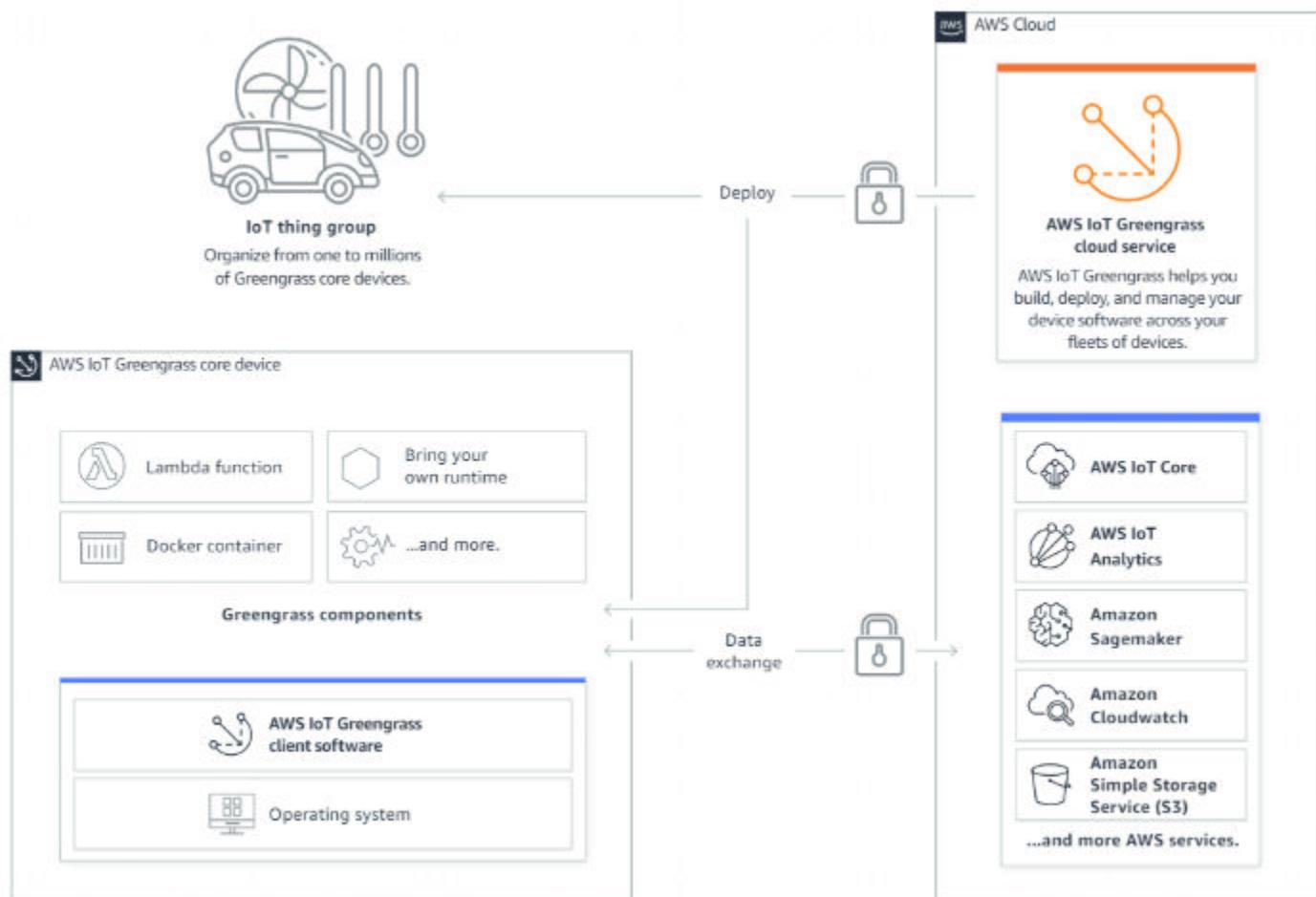


Figure 2. AWS IoT Greengrass architecture

# Integration benefits

Combining Dell NativeEdge, AWS IoT Greengrass, and AWS SageMaker offers comprehensive and powerful edge computing and AI solutions. The solution enhances performance, reduces latency, and provides a flexible, scalable approach to edge computing. Key benefits include:

- Enhanced performance—Edge computing with AWS Greengrass has become a technology for customers looking to enable real-time far-edge data processing with opportunities for data collection in the cloud.
- Flexible deployment—Dell NativeEdge offers application flexibility. It provides a wide variety of infrastructure choices and architectures. Dell NativeEdge, with its high availability architecture, ensures enterprise availability for AWS Greengrass applications when needed.
- Scalability—Adapt to changing requirements and scale as needed. Together, Dell NativeEdge with AWS Greengrass customers can gain the competitive advantage by enabling full-stack agility.
- Advanced security—Secure data storage, encryption, and access controls at both the edge and in the cloud. Dell NativeEdge complements the application layer security with zero-trust device onboarding, Hypervisor, and infrastructure life cycle management that is not available with AWS Greengrass alone.
- Bandwidth efficiency—Process data closer to the source, reducing cloud transmission needs.
- AI Inferencing—Existing or new AI models can be trained on AWS SageMaker and with AWS SageMaker Neo, it deployed at the edge using AWS IoT Greengrass on a NativeEdge Endpoint.

This integrated solution is ideal for applications such as industrial automation, transportation systems, and smart cities, providing a robust and efficient edge computing environment that is tailored to meet specific needs.

## Use cases

- Industrial IoT—Monitoring and controlling industrial equipment in real-time, with local processing of sensor data to optimize operations.
- Retail—Managing point-of-sale systems and inventory management applications at the edge, reducing dependency on cloud connectivity.
- Smart Cities—Implementing smart infrastructure solutions, such as traffic management and environmental monitoring, with real-time data processing at the edge.

# Technical architecture

The integrated solution combines Dell NativeEdge and AWS IoT Greengrass to deliver seamless edge computing. This technical architecture is designed to provide a robust and scalable framework for edge computing applications. The solution leverages the strengths of both Dell NativeEdge and AWS IoT Greengrass to provide a comprehensive edge computing platform. Dell NativeEdge provides a secure and managed edge platform, while AWS IoT Greengrass enables local data processing, analytics, and machine learning capabilities. The technical architecture of the integrated solution includes several key components.

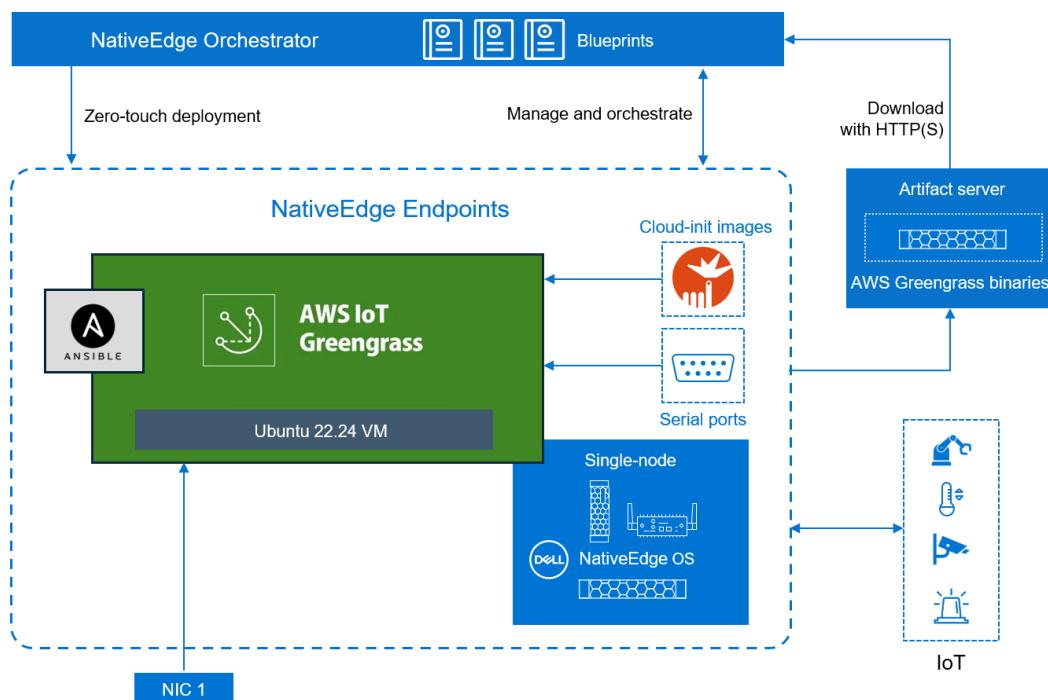
NativeEdge Orchestrator is a centralized management platform that allows you to deploy, manage, and monitor applications and services across edge devices. It provides a unified interface for orchestrating workloads, ensuring that applications are running efficiently and securely at the edge.

NativeEdge Endpoint refers to the edge devices that are managed by the NativeEdge Orchestrator. These endpoints can be various types of hardware, such as IoT devices, gateways, or edge servers, which run the applications and services that are deployed by the orchestrator. The endpoints are critical for running workloads close to where data is generated, reducing latency and improving performance.

AWS Greengrass Blueprint is designed to efficiently deploy AWS Greengrass onto one or more NativeEdge endpoints. This blueprint outlines how to deploy and manage applications efficiently across edge devices using the combined capabilities of both platforms.

Artifact Server in the NativeEdge ecosystem is responsible for storing and distributing the application artifacts (such as container images, binaries, and configuration files) needed for deployment on edge devices. It ensures that the correct versions of applications are available and can be securely delivered to the endpoints.

AWS IoT Greengrass installer sets up the Greengrass environment on the endpoints, enabling them to process data locally and interact with AWS cloud services.



**Figure 3. AWS IoT Greengrass deployment using NativeEdge**

# Blueprint deployment

The deployment that is shown in the following example shows how the NativeEdge blueprint can expedite AWS IoT Greengrass deployments without manual configuration using NativeEdge Orchestrator. With AWS IoT Greengrass, there are many AWS services that can be used such as AWS IoT Core, AWS SageMaker, Lambda.

## Prerequisites

- Ensure that the NativeEdge Endpoint is online and connected to the Orchestrator.
- Confirm that the NativeEdge Endpoint has Internet access and can connect to AWS.
- Confirm that the AWS user access ID and user access key are ready before deploying AWS Greengrass using the NativeEdge blueprint.

## About this task

To deploy the AWS IoT Greengrass blueprint, perform the following steps.

## Steps

1. Log in to NativeEdge Orchestrator and click **Blueprints**.
2. Select the **AWS IoT Greengrass blueprint** from the blueprint catalog and click **Deploy**.

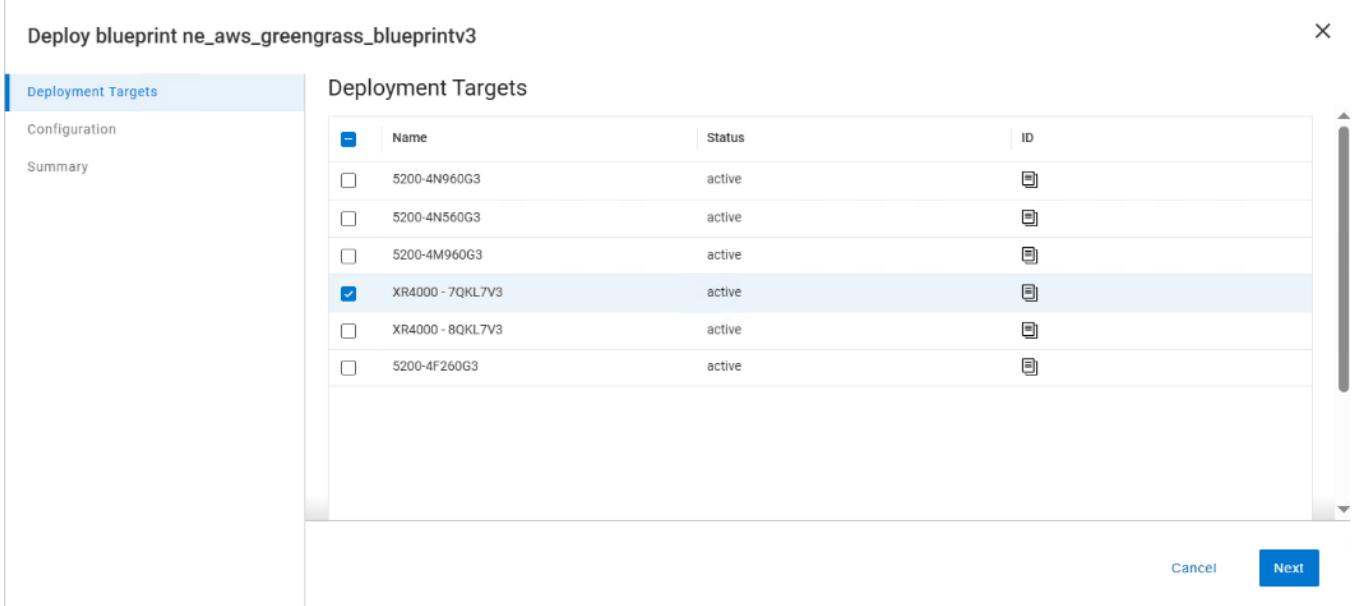
The screenshot shows the Dell NativeEdge Orchestrator web interface. The left sidebar has a navigation menu with options: Dashboard, Endpoints, Blueprints (which is selected and highlighted in blue), Deployments, Rules, Notifications, and Settings. The main content area is titled "Blueprints" and displays a list of available blueprints:

Blueprint Name	Description	Type	Deployments	Created	Revision	Status
ne_aws_greengrass_blueprintv3	This blueprint creates a Virtual Machine on a NativeEdge Endpoint and provides the VM login...	service	0	01-Jul-2025 05:16 PM	1.0.0	Uploaded
ne_open_pos_blueprint	This blueprint creates a Virtual Machine on a NativeEdge Endpoint and provides the VM login...	service	1	30-Jun-2025 02:06 PM	1.0.0	Uploaded
bare_metal_nginx	Creates a podman container on a bare metal server, on a NativeEdge Endpoint, which exposes Hello...	container	1	26-Jun-2025 09:45 AM	1.0.0	Uploaded
compose-blueprint-no-tls		service	0	26-Jun-2025 09:21 AM	1.0.0	Uploaded
compose-blueprint-nginx-jt		container	1	25-Jun-2025 03:03 PM	1.0.1	Uploaded
docker-compose-nginx		container	1	25-Jun-2025 11:13 AM	1.0.0	Uploaded

At the bottom of the page, there is a pagination control: "Show: 25 per page".

Figure 4. AWS IoT Greengrass blueprint deployment

3. On the **Deployment Target** tab, select the endpoint on which to deploy AWS IoT Greengrass and click **Next**.



**Figure 5. Blueprint Deployment Target selection**

4. On the **Configuration** tab, enter the required information such as **AWS access key ID**, **AWS access secret**, and VM configuration such as **GPU passthrough** for AI inferencing.

Deploy blueprint ne\_aws\_greengrass\_blueprintv3

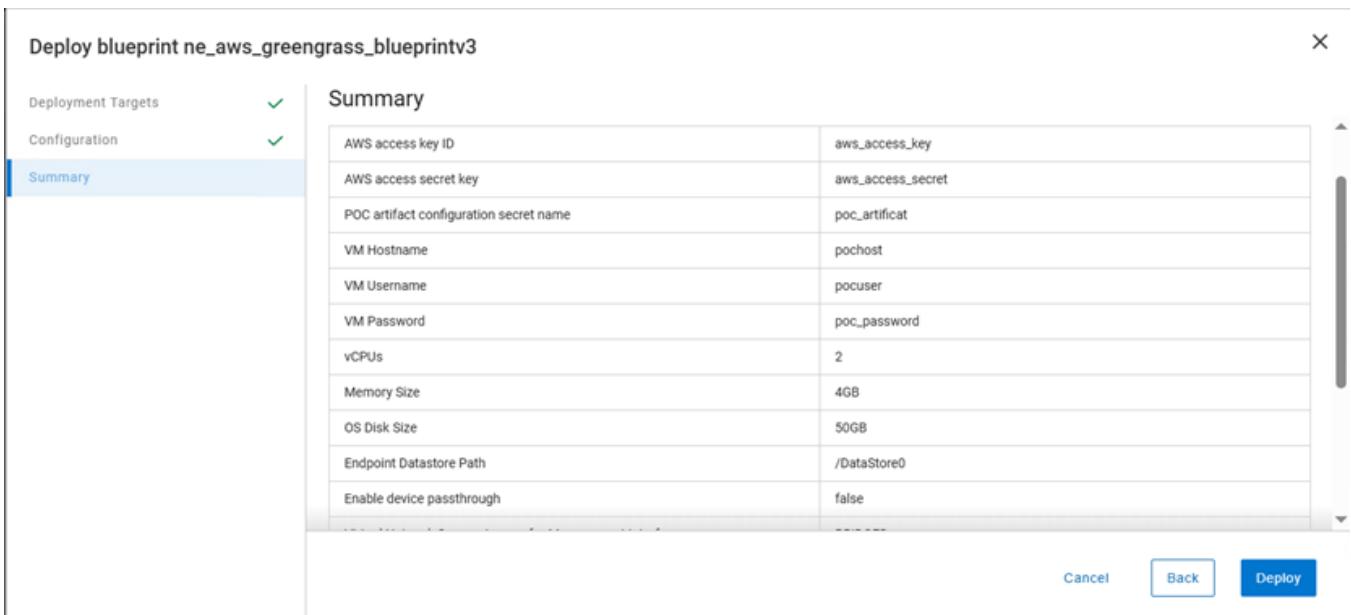
✓ Configuration

Deployment Targets	Deployment name <span style="color: blue;">ⓘ</span>
<a href="#">Configuration</a>	aws_greengrass
Summary	Deployment Inputs
	Select file to load Inputs values from (optional): <a href="#">Browse</a>
	AWS access key ID <span style="color: blue;">ⓘ</span>
	aws_access_key
	AWS access secret key <span style="color: blue;">ⓘ</span>
	aws_access_secret
	POC artifact configuration secret name <span style="color: blue;">ⓘ</span>
	aws_artifact
	VM Hostname <span style="color: blue;">ⓘ</span>

Cancel Back Next

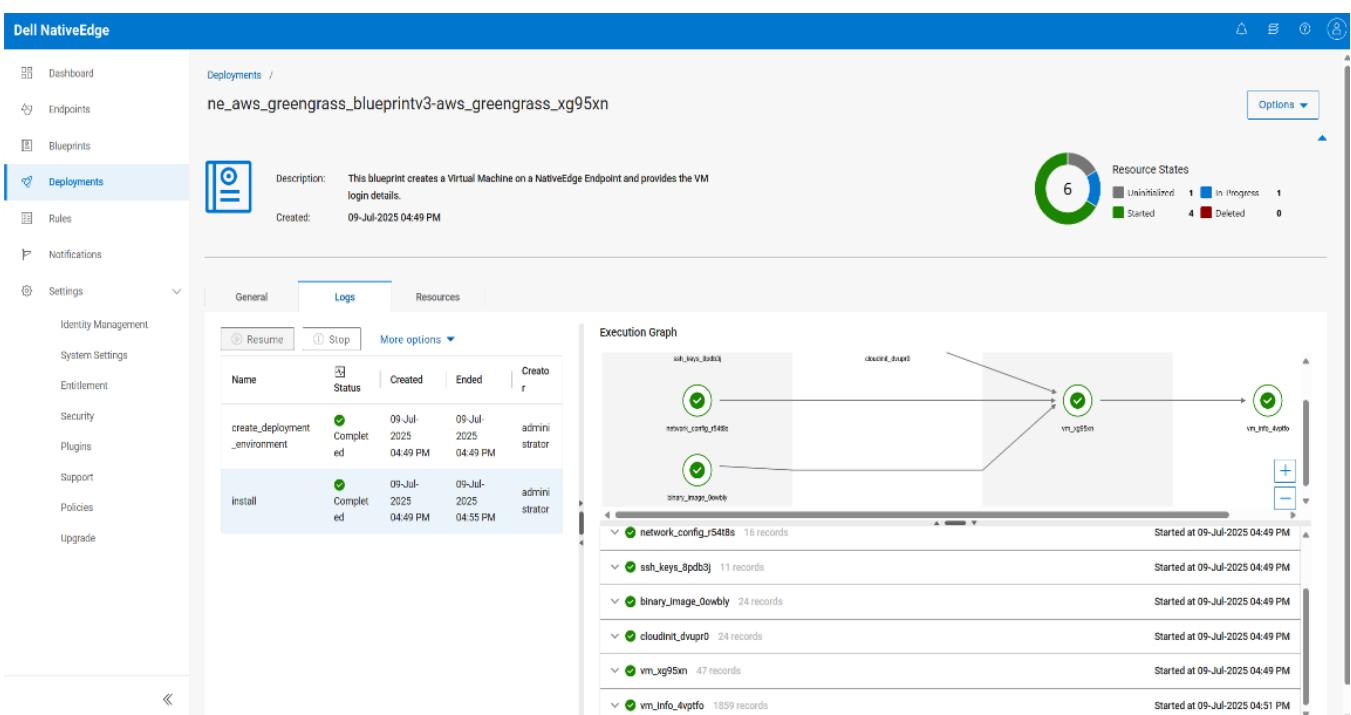
**Figure 6. AWS IoT Greengrass blueprint Configuration**

5. In the **Summary** tab, verify all the information and click **Deploy**.



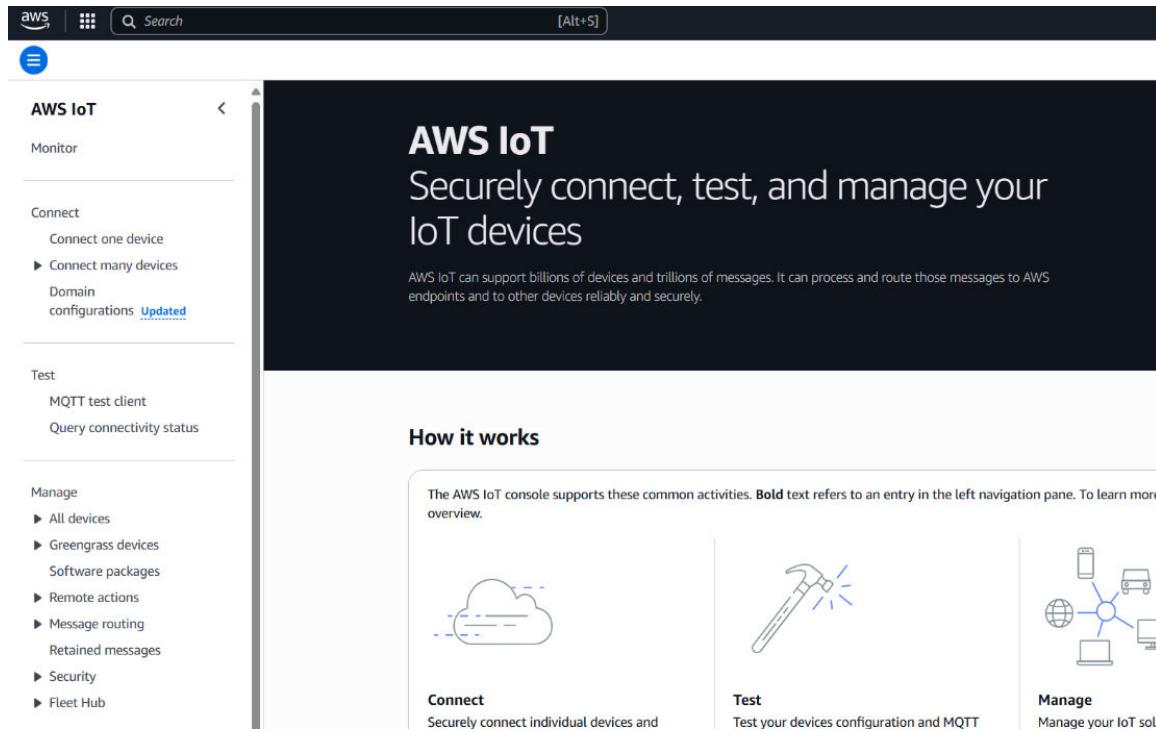
**Figure 7. AWS IoT Greengrass blueprint Summary tab**

6. You can view the deployment on the **Deployments** page. Click the **AWS Greengrass deployment** name to open the details page, then click **Logs** to view the deployment logs and the **Execution Graph**.



**Figure 8. AWS IoT Greengrass deployment Logs**

7. Once the deployment is done, open the **AWS console** and select the **AWS IoT** page.



**Figure 9. AWS console login**

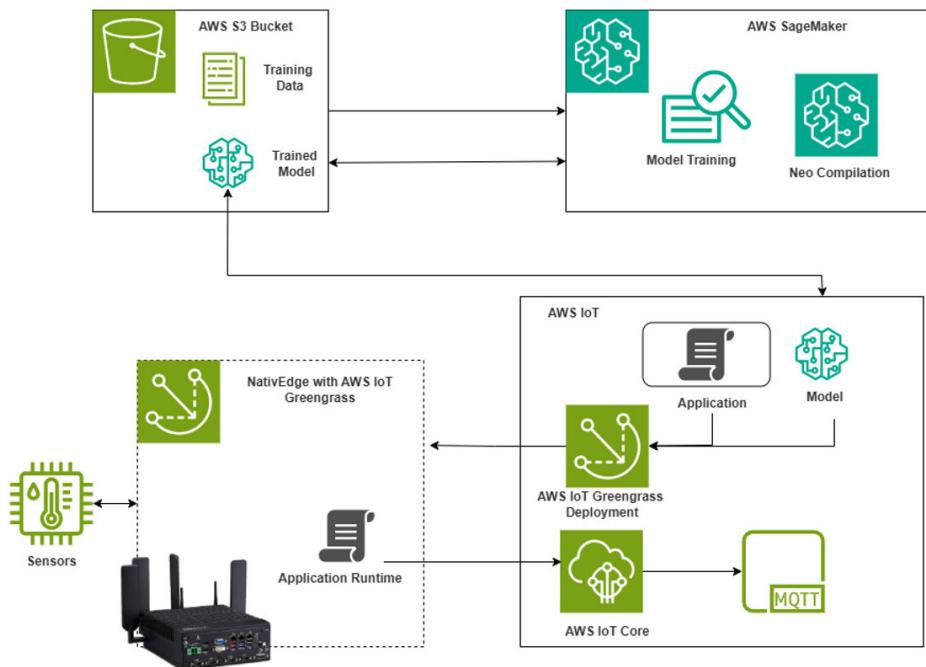
- From the left side menu, select **Manage > Greengrass devices > Core devices**. Then see the **GreengrassQuickStartCore** device listed in the **Name** column.

Name	Status	Runtime	Status reported
<a href="#">GreengrassQuickStartCore-1979e7ce201</a>	Healthy	aws_nucleus_classic	8 minutes ago

**Figure 10. AWS IoT Greengrass Core devices**

# Blueprint management

AWS SageMaker: Once AWS IoT Greengrass is deployed, AI, ML workloads can be trained in AWS and then deployed on the Greengrass core device. AWS SageMaker provides a robust environment for developing, training, and optimizing machine learning models. These models can be compiled and packaged using SageMaker Neo and SageMaker Edge Manager, ensuring they are optimized for edge devices. By leveraging AWS IoT Greengrass, these models can be deployed to edge devices, enabling real-time inference and decision-making at the edge. This integration facilitates efficient and scalable deployment of AI workloads, enhancing the capabilities of IoT applications.



**Figure 11. AWS Greengrass, AWS SageMaker running on a NativeEdge Endpoint**

Dell NativeEdge Endpoints, known for high-performance compute capabilities and ruggedized design, provide an ideal platform for running these optimized models. The combination of AWS SageMaker's model optimization tools and the NativeEdge infrastructure ensures peak performance, low latency, and reliable operation in demanding environments. This integration empowers organizations to scale AI workload efficiently, bringing intelligence closer to where data is generated and decisions are made.

**Better Together**—The SageMaker models are trained in AWS but deployed on Dell edge hardware, creating a powerful synergy and ensuring that models run at peak performance. This setup allows for highly localized inferencing, minimizing latency issues that can arise from Internet-based processing. This seamless integration of AWS SageMaker, AWS IoT Greengrass, and Dell NativeEdge enhances performance and efficiency, making real-time capabilities a reality and boosting the overall effectiveness of IoT applications.

# Conclusion

The integration of Dell NativeEdge, AWS IoT Greengrass, and AWS SageMaker forms a powerful edge computing solution that enhances efficiency, performance, and scalability. By processing data closer to the source, this solution reduces latency, enables real-time decision-making, and supports running AI workloads at the edge. Which is crucial for applications such as industrial automation, transportation systems, and smart cities.

The combined strengths of these technologies provide a robust, secure, and scalable platform that meets the specific needs of various industries. This drives innovation, unlocks new opportunities, and ensures that organizations can respond swiftly to changing demands and conditions.

## References

- Dell NativeEdge home page: [Dell NativeEdge | Dell USA](#)
- Dell NativeEdge Blueprint Developer's Guide: [Dell NativeEdge Blueprint Developer's Guide](#)
- AWS IoT Greengrass home page: [AWS IoT Greengrass](#)
- Amazon SageMaker home page: [Amazon SageMaker](#)