
AWS
re:Invent
NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

STG211

Hybrid cloud storage and edge compute: AWS, where you need it

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Agenda

AWS cloud-to-edge continuum

AWS Storage Gateway

AWS Outposts

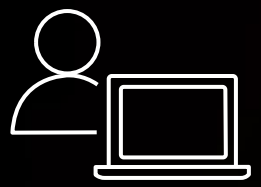
AWS Snow Family

Guest speaker: AWS Snowball Edge and AWS Disaster Response

Q&A

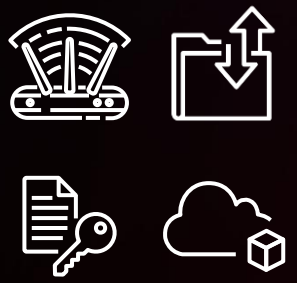
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Learning from our customers



Extend the cloud

Bring infrastructure, services, tools and experiences wherever customers need them – in the cloud, on premises, and at the edge



Use cases

Low-latency applications, migrate and modernize, local data processing, and data residency



Challenges with solutions today

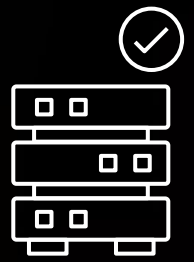
Complexity, cost, and maintenance of solutions on premises and at the edge

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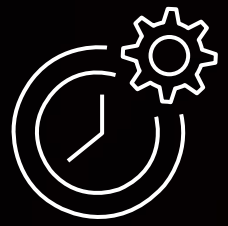
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Customers want the same experience

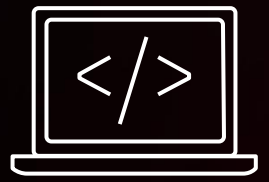
ACROSS ON PREMISES, THE EDGE, AND THE CLOUD



Same reliable, secure, and high-performance infrastructure



Same ownership model and operational consistency



Same APIs for supported services



Same tools for automation, deployments, and security controls



Same pace of innovation as in the cloud

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AWS Storage Gateway

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The hybrid cloud model

You have **on-premises** data and applications . . .



. . . that want to use storage and services in **the cloud**

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Hybrid cloud storage challenges



On premises

In the cloud



I am running out of on-premises storage capacity . . .	. . . and need to use scalable, durable, and secure cloud storage
I want to run my existing applications without change (files, backups, archive) . . .	. . . but leverage the infinite scale of the cloud
I need low-latency, on-premises access to data in the cloud . . .	. . . while accessing the power of cloud compute and analytics
Compliance requires that I integrate with enterprise security and management tools . . .	. . . but I want to manage and monitor from a single pane of glass

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AWS Storage Gateway

PROVIDING CLOUD-BACKED FILE SHARES, VIRTUAL TAPES, AND BLOCK VOLUMES



Amazon S3 File Gateway

Native file access, SMB or NFS, to Amazon S3 for **backups**, **archives**, and ingest for **data lakes**



Amazon FSx File Gateway

Replace on-premises Windows file shares with efficient, low-latency Amazon FSx for Windows File Server based **group file shares** and **home directories**



Tape Gateway

Replace physical tape infrastructure, leveraging Amazon S3 archive tiers for long-term retention



Volume Gateway

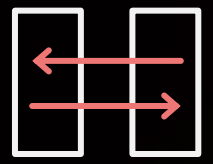
Block storage volumes with snapshots, AWS Backup integration, and cloud recovery

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Storage Gateway benefits

PROVIDING ON-PREMISES APPLICATION ACCESS TO VIRTUALLY UNLIMITED CLOUD STORAGE



Standard protocols

No changes to existing apps



Local caching

Low-latency access to frequently used data



Optimized data transfers

Minimized network traffic



Provides security and supports compliance

FIPS, HIPAA, PCI, SOC*, ISO**, and encryption



Cost-effective

Pay-as-you-go pricing



AWS integrated

Management, monitoring, and in-cloud workloads

*SOC (1, 2, 3) **ISO (9001, 27001, 27017, 27018)

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Storage Gateway customers



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S3 File Gateway customer story

moderna™
messenger therapeutics

"AWS Storage Gateway lets us easily integrate data files from analytical instruments . . . and the transparent S3 storage lets us easily connect our cloud-based applications and leverage the powerful storage capabilities of S3. **With the AWS File Gateway, we can now unleash the full power of AWS on our instrument data.**"

Dave Johnson, PhD
Director of Informatics

Problem

- Made a strategic decision to leverage AWS for processing and analyzing scientific data
- Accelerate moving scientific data that is generated on premises to the cloud

Solution

- Deploy multiple Storage Gateway appliances to copy scientific data to Amazon S3
- Process and analyze 100s of TBs of data in Amazon S3

Outcome

- On-premises scientific instruments get low-latency access to cloud storage
- Lower cost and simplicity
- Automation of data management

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S3 File Gateway customer story



"Using our old, traditional backup system, and current system using File Gateway, we had about **90% reduction in cost**. This was an amazing savings for us. This obviously went right to the bottom line."

Abdul Mohammed
Senior IT Architect
Kellogg Company

Problem

- Migrating data centers and applications to AWS
- Many on-premises databases and assets to migrate; need to back up and archive these workloads
- High costs with traditional backup solution

Solution

- Use File Gateways for backup of SAP on Oracle environments, hybrid backups, and archives of SQL databases, Hadoop clusters, and other applications
- Keep on-premises access to in-cloud data

Outcome

- Reduced backup costs by ~90% and eliminated traditional backup solution
- Accessed 100s of TB of storage and backups in the cloud through just a few TBs on premises

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Tape Gateway customer story



"The reason we moved to AWS was the unreliability of physical tape. **It's about 65% cheaper now storing the data up in AWS**. All I do now literally is go into the [AWS] console, add in tapes, and eject tapes and I'm done. It made my job a lot easier."

Paul Walsh
Senior Systems Engineer

Problem

- Physical tape infrastructure and offsite archives
- Costly and time consuming waiting for tapes to arrive
- Experienced regular failures when recovering from tap

Solution

- Switched to cost-effective virtual tapes using Tape Gateway
- Create tapes as needed and store them in Amazon S3 Glacier and Amazon S3 Glacier Deep Archive for long-term storage

Outcome

- Easily switched to virtual tapes in less than one month
- Eliminated the need to pay upfront warehousing costs

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S3 File Gateway customer story

EXACT SCIENCES

"Exact Sciences has implemented AWS Storage Gateway as the foundation for NGS Data Lake on AWS, **relying on the flexibility, scalability, ease of management, and native AWS integrations**. The solution scales indefinitely to provide robust processing for short-term time-sensitive workloads and long-term data lake capabilities, all while **lessening on-premises footprint in favor of relying on cloud-native services**."

Raj Jampa
VP, Infrastructure Operations

Problem

- Producing large amounts of NGS data in labs around the world and need to send it to AWS for processing
- Rapidly expanding global lab footprint and need to scale data transfer capabilities
- Current on-premises solutions are complex to manage and expensive to procure and deploy

Solution

- Deploy multiple Storage Gateway hardware appliances to transfer data from NGS lab machines to Amazon S3
- Seamlessly access 100s of TBs of data in Amazon S3 for processing

Outcome

- Scalable data ingestion solution that can be rapidly deployed
- Reduce on-premises infrastructure management and cost; automate data pipeline management
- Accelerate data migration to cloud and decrease turnaround time of data processing
- Seamless integration with AWS services

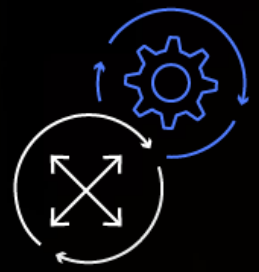
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Storage Gateway enables demanding hybrid cloud storage use cases

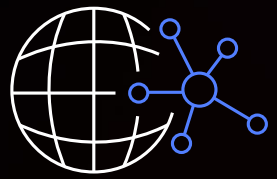
PROVIDING HYBRID CLOUD STORAGE FEATURES FOR ENTERPRISE CUSTOMERS

Expanding deployment options



- Virtual – VMware, Hyper-V, KVM, Amazon EC2
- Preconfigured hardware appliance

Increasing availability



- HA for VMware vSphere deployments
- Available in all 27 AWS Regions

Enhancing security and compliance



- Audit logging for NFS and SMB file shares
- WORM and tape retention lock for tapes
- FedRAMP Moderate and High authorization

Scaling performance



- Up to 64 TB cache
- Schedule-based bandwidth throttling
- Continuous performance enhancements

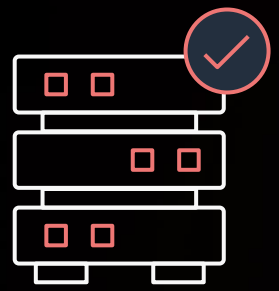
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AWS Outposts

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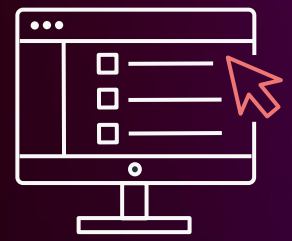
AWS Outposts: Bringing AWS on premises



Same AWS designed infrastructure as in AWS data centers (built on AWS Nitro System)



Fully managed, monitored, and operated by AWS as if in AWS Regions



Single pane of management in the cloud providing the **same APIs and tools** as in AWS Regions

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AWS Outposts family

ON PREMISES

RUN AWS INFRASTRUCTURE AND SERVICES ON PREMISES



Outposts rack

Bring the same AWS APIs, services, and features to virtually any datacenter or co-location space



Outposts servers

Run Outposts in locations with limited space or smaller capacity requirements

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AWS Outposts

ON PREMISES



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Nasdaq

- Nasdaq wanted to migrate their mission-critical equities and options markets to the cloud to prepare for the future. It requires the underlying infrastructure to be hyper-scalable, ultra-resilient, and highly performant

- Deploying North American markets on a co-designed edge compute solution using AWS Outposts

- End-to-end order-to-trade process occurs in low double-digit microseconds with a 10% performance improvement in network latency, creating a cloud migration blueprint for 130+ markets infrastructure customers

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AWS Snow Family

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What is the rugged mobile edge?

Rugged, mobile edge









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Why is it important for customers?





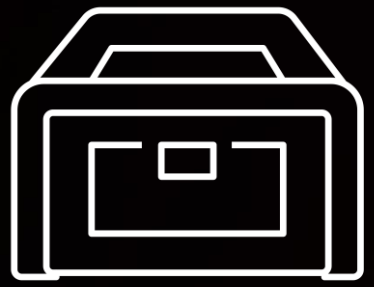
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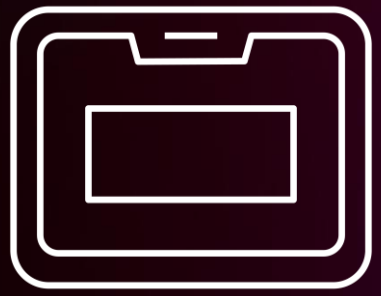
FAR EDGE

PHYSICAL DEVICES TO AGGREGATE AND PROCESS DATA IN RUGGED EDGE LOCATIONS, THEN TRANSFER TO AWS



AWS Snowcone

Compact and portable device, purpose-built for use outside of a traditional data center



AWS Snowball

Compute-optimized or storage-optimized device for extreme conditions

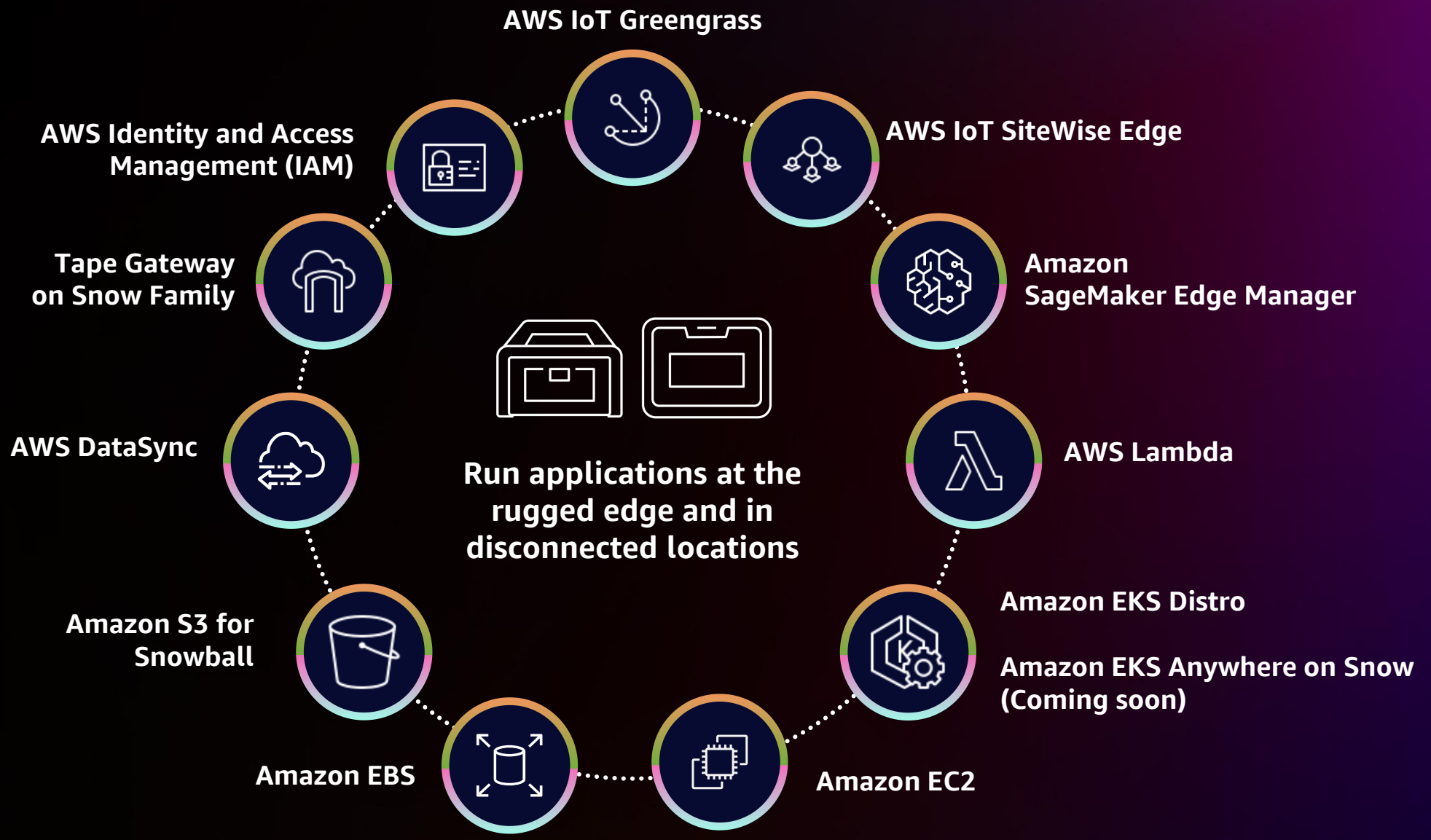
Available for clustering, scaling, and connectivity

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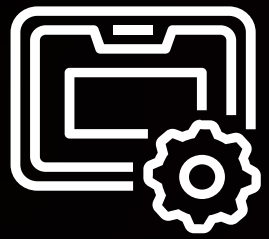
FAR EDGE



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AWS Snowball with Tape Gateway

MIGRATE PHYSICAL TAPE ARCHIVES TO AWS OFFLINE



AWS Snowball

Offline data migration

Secure data migration to AWS

Same device ordering and shipping experience

+



Tape Gateway

The AWS Storage Gateway virtual tape library

Works with popular backup applications

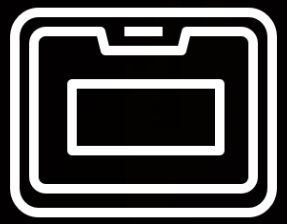
Clone physical tape data to virtual tape

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Amazon EKS Anywhere on Snow

COMING SOON

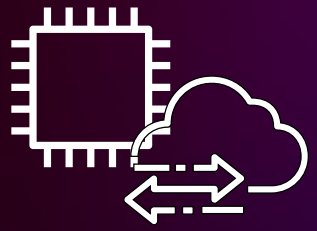
RUN EKS-A ON AWS SNOW FAMILY DEVICES FOR RUGGED, DISCONNECTED CONTAINER WORKLOADS AT THE EDGE



Provides an installable software package for creating and operating Kubernetes clusters



Deploys containerized applications to Snow Family devices in a fault-tolerant and highly available fashion



Enables automation for cluster management, reduced support costs, and elimination of redundant efforts of using multiple tools for operating Kubernetes clusters

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Identifying health and safety risks: Using the power of AI/ML, 5G MEC, containerized applications, and local edge computing

Challenge

Mavenir is a 5G ISV that offers a fully containerized packet 5G core portfolio to modernize existing mobile networks; their customer Spark (New Zealand–based telecommunications and digital services company) and Qrious (Spark's AI and data analytics business) wanted to build a hazard detection system for EnviroNZ to help them detect if people are too close to excavators working in the waste disposal area at a busy resource recovery center

Solution

Spark leverages a combination of an AI-powered computer vision solution built by Qrious and a containerized 5G core solution by Mavenir for EnviroNZ, delivering a hazard detection system running on EKS Anywhere on Snowball Edge devices

Result

Spark and Qrious developed a cutting-edge AI solution that could make EnviroNZ sites safer by enabling them to anticipate and react immediately if someone bypasses their safety controls; the pilot of the computer vision system, running Mavenir's 5G core on EKS-A on Snow, helps solve a key business issue for EnviroNZ at its resource recovery center, identifying health and safety risks

"We are looking for ways to bring the potential of 5G to life – demonstrating how faster throughput, lower latency and high levels of reliability can create tangible business outcomes. We are looking forward to working with the business community in the coming years to identify and test further use cases."

Mark Beder, Technology Director for Spark



MAVENIR

Spark nz

Qrious

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AWS Snowball Edge Compute

Private 5G Network on Wheels (NOW) for Telenor

Challenge

The Norwegian Army required a mobile wireless network for secure communications during search and recovery efforts in tactical and rugged edge locations

Solution

Telenor deployed a Private 5G Network running Athonet's 5G Core on AWS Snowball Edge operating on a mobile trailer

Result

- NOW provides mobile, secure communications for search and recovery and incident response situations
- Enables rugged edge operation in areas with little to no stable infrastructure
- Can be operated in a fully disconnected fashion from the AWS Cloud

We are delighted to work with innovative companies like [...] AWS to power 5G-SA private mobile solutions. We enable operators [...] to deploy agile private networks on customer premises that combine localized connectivity and control with access to the infinite resources and applications of AWS."

Gianluca Verin, CEO of Athonet

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AWS Snowball Edge Compute

Snowcone in the International Space Station

Challenge

Future space stations will include robust cloud data center capabilities to process and monetize internal and external data sources; Axiom Space wanted a cloud computing demonstration to be included in their early demonstration missions that precede the start of construction of the Axiom Station in 2024, with the first mission occurring in early 2022

Solution

Snowcone was an immediately available and already ruggedized device that could demonstrate edge compute and storage capabilities to support a notional ML object-recognition workload

Result

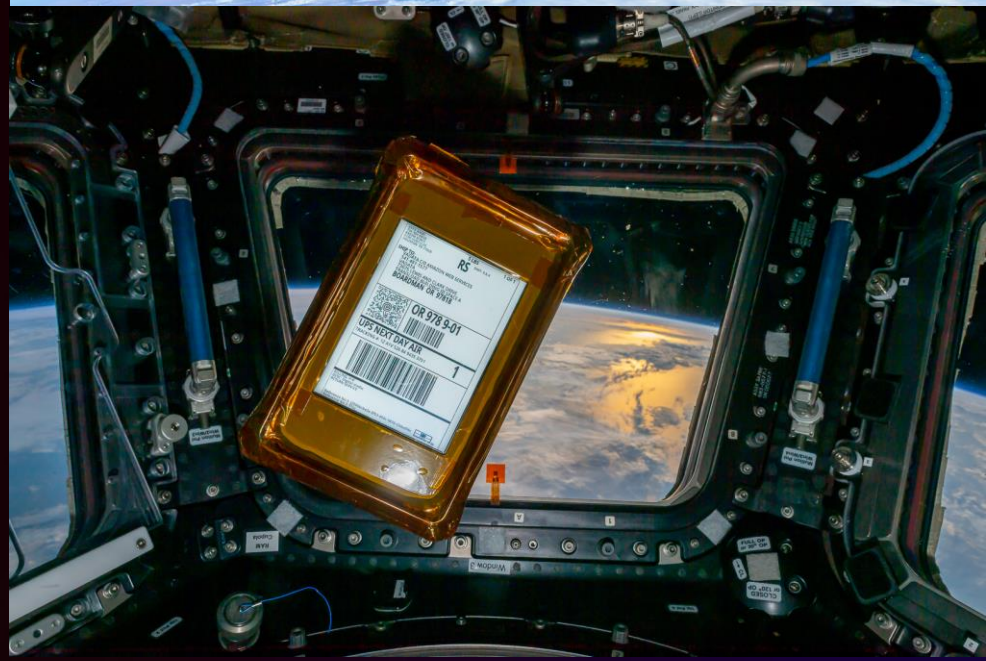
- On April 8, 2022, Ax-1 (with Snowcone onboard) launched from historic launchpad 39A at Kennedy Space Center
- Astronauts on the ISS, with direction from the AWS and Axiom ground crew, successfully operated a Snowcone and processed images using a pre-trained ML model
- Many lessons learned that we can build upon as we pursue AWS in space

"The success of this first private astronaut mission to the International Space Station is an important step in opening opportunities for space travelers and achieving NASA's goal of enabling commercial business off the planet in low-Earth orbit."

Bill Nelson, NASA Administrator



Image credit: NASA



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AWS Snowcone

Safeguarding Ukraine's data to preserve its present and build its future

Challenge

In February 2022, the Russian government invaded Ukrainian territory and the Ukrainian government had an urgent need to safeguard critical data essential for government operation and its citizens' wellbeing by migrating data to cloud

Solution

The AWS Disaster Response and AWS Public Sector teams collaborated with the Ukrainian government to create Project Sunflower, which used AWS Snowball Edge devices to migrate critical government and commercial data to the cloud; the Snow team collaborated with the Project Sunflower team to make Snowball devices readily available for use by the WWPS SA team for the data migration

Result

- Snowball Edge successfully migrated PBs of critical government data into the AWS Cloud from Ukraine locations
- Enabled Ukrainian government and public to have access to critical data despite being in a war

"We used to assume that this is just how it is in war – everything gets destroyed and you have to rebuild from nothing. But by migrating to the safety and security of the cloud, the government and its citizen services prevail."

Liam Maxwell, Director of Government Transformation, WWPS



Project Sunflower

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AWS Snowball Edge Compute

AWS disaster preparedness and response

As a pillar of the **AWS Global Social Impact team**, our program's mission is to support communities throughout the disaster lifecycle by improving access to AWS technologies, technical expertise, and volunteerism which reinforces Amazon's core value that success and scale bring broad responsibility



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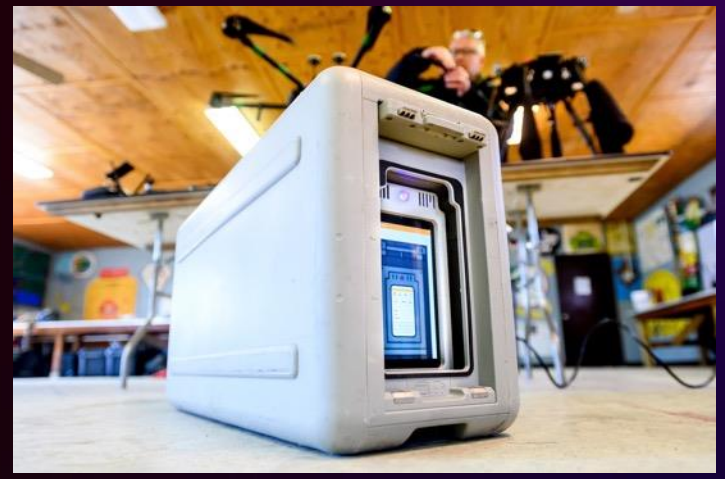
Field text exercise (FTX) program

- 2–3 day events
- Failure safe environment
- Increased collaboration with a focus on building







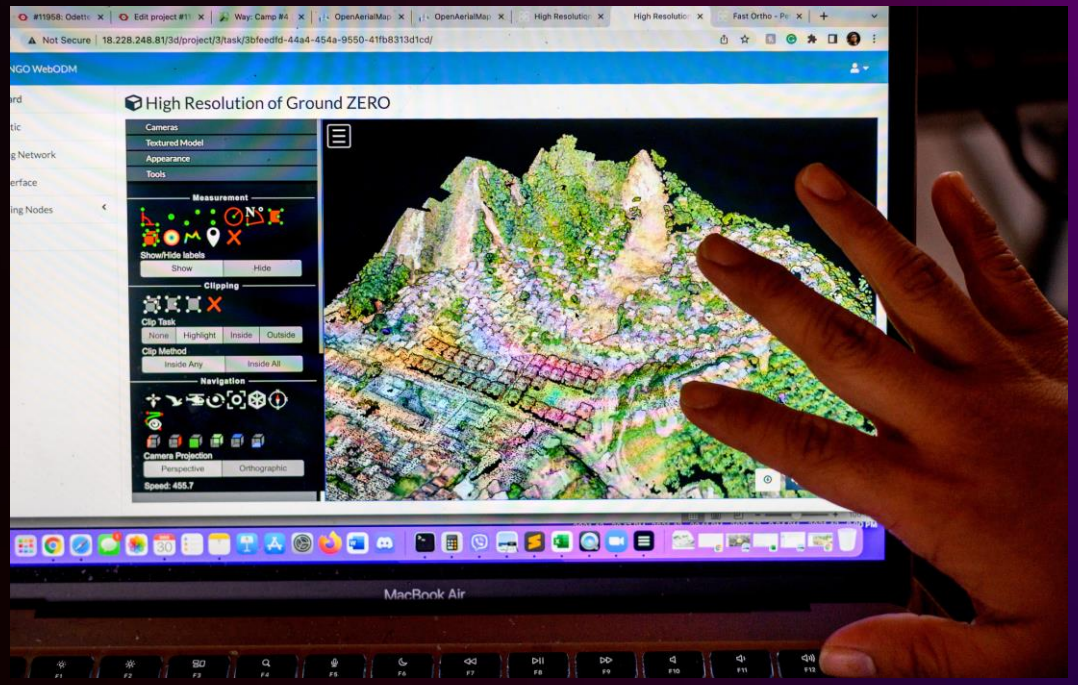


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UAS mapping at the edge

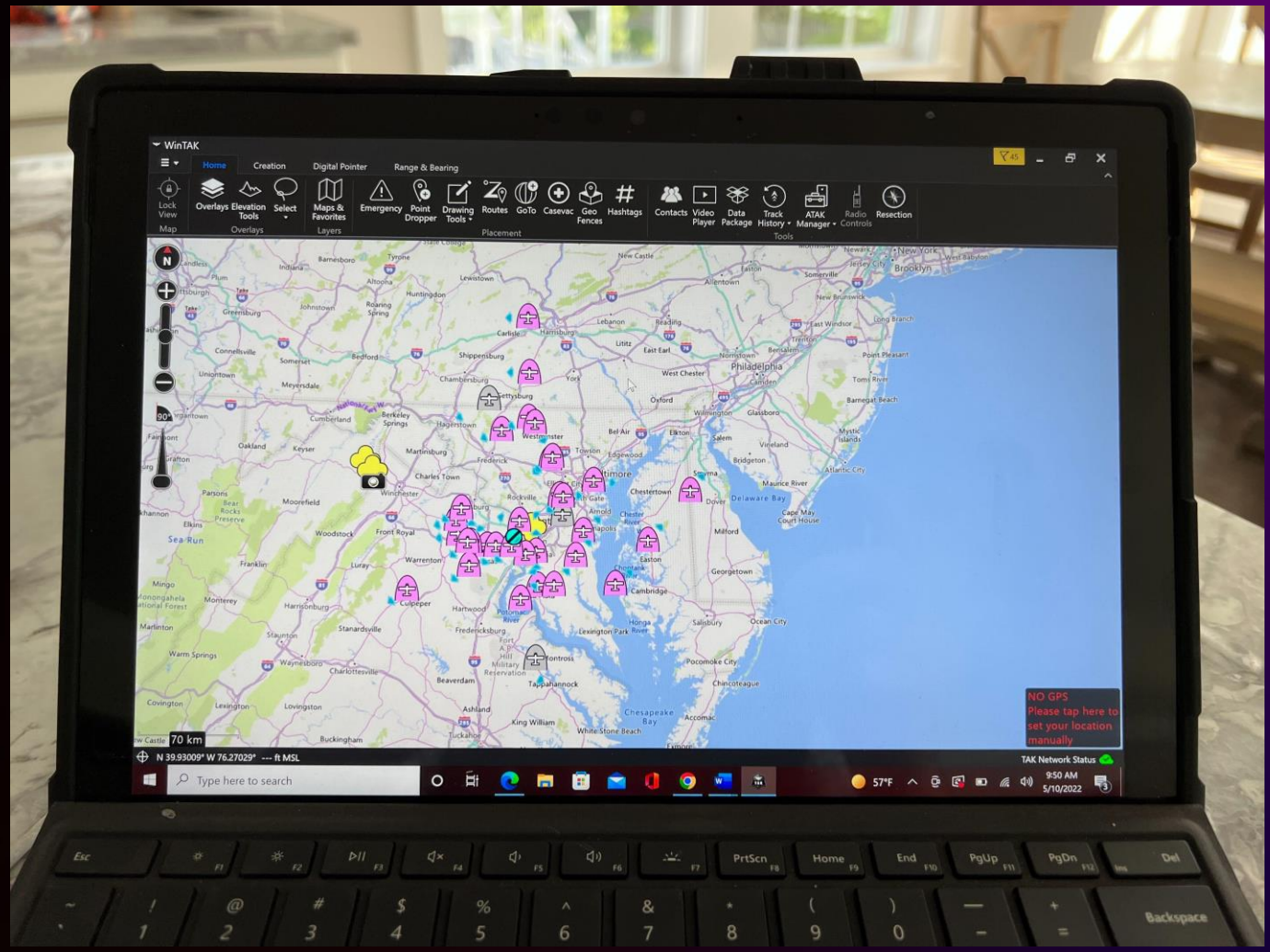
- Deliver 2D and 3D maps without connectivity
- Scales to multiple UAS pilots quickly
- Openly available software



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Augmented situational awareness

- Locations of commercial aircraft, UAS, vehicles, and ground teams
- Scales through the AWS IoT Core
- Data streamed to an open source common operating picture



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UAS object detection

- Live UAV feed captured at a forward location
- RTMP transport to Snowball Edge
- Restream to multiple clients, including ATAK via secondary RTMP stream
- Low latency, despite being 0.75 miles away from the edge device
- Working with USAF team to implement AWS Elemental at the edge



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Resources



Get started with Storage Gateway
aws.amazon.com/storagegateway



Get started with Snow Family
aws.amazon.com/snowball

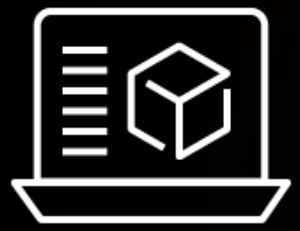


Get started with Outposts
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Continue your AWS storage learning

Build a learning plan



Set your AWS Storage Learning Plans via **AWS Skill Builder**

Increase your knowledge



Use our **Ramp-Up Guides** to build your storage knowledge

Earn AWS storage badges



Demonstrate your knowledge by achieving **digital badges**

aws.training/storage

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Thank you!

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