Run AI powered apps on the edge with Azure Data Box Edge

Kundana Palagiri, Principal Program Manager, Microsoft Azure
**Microcontroller**

**Azure Sphere**
- Integrated Circuit designed to govern a specific operation in an embedded system
- Highly-secured, connected MCU
- Azure Sphere Linux OS for modern MCUs
- Included Azure IoT Device SDK

**IoT Devices**

**Azure IoT Device SDK**
- Endpoint devices such as appliances, vehicles, or factory machines that connect, interact and exchange data
- 1000+ devices
- 250+ partners
- All certified to work great with Azure IoT Hub

**Edge Devices**

**Azure IoT Edge**
- Devices that aggregate, process & provide gateway capabilities for IoT endpoints
- Deploy and manage Azure Services in containers on any IoT device
- AI, AzureML, Azure Stream Analytics and more

**Edge Appliances**

**Azure Data Box Edge**
- Integrated appliances that provide a subset of cloud edge roles, such as ML-inferencing
- Data Box Edge: AI-Enabled, Storage and compute Azure Edge appliance
- Data Box: Offline, ruggedized data transport, 100 TB – 1 PB

**Edge Stack**

**Azure Stack**
- Scalable solutions that provide a full cloud stack, including IaaS and PaaS capabilities
- Edge and Disconnected Scenarios
- Regulatory Requirements
- Cloud app model on-premises

**Hyperscale Cloud**

**Edge Regions**
- First-party cloud regions
- Full Range Hyperscale Cloud Services
- Tiered Service availability: Heroes > Hubs > Satellites
- Open Source Based Services & Tools

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**Most specialization**
- Fewest services

**Full Spectrum of Cloud + Edge Form Factors**
- Intentional & Appropriate Azure Service Availability

**Fewest form factors**
- Most services
Azure Data Box Edge

An AI-enabled Edge computing appliance with network data transfer capabilities

Network Storage Gateway
Network data transport to Azure while retaining local access to files

Edge compute/data preprocessing
Use IoT Edge compute modules to analyze, filter, and transform data as it moves to Azure

GPU and FPGA powered by Azure Machine Learning
Accelerate ML inferencing of images and video streams to get results close to the data source

Cloud managed
Easily manage your fleet from the Azure portal
Edge compute
Data Box Edge combines edge compute and Storage Gateway

Compute pipeline powered by IoT Edge
Integrated with Storage Gateway so modules can easily operate on Storage Gateway files
Modules can connect with on-premises sensors and systems to process all kinds of inputs
Storage Gateway extends Azure storage to Edge

Exposes SMB and NFS shares on your local network, creating a gateway into your Azure Storage account

Keeps a local cache of your most recent files for fast local access

All you need to do is copy to a local file share and we upload
Azure IoT Edge

**IoT Edge modules**
Run Azure services directly on any device. AI, Azure ML, stream analytics, functions, SQL or bring your own code

**Secure**
Designed for security from the ground up and only secure devices get certification

**Open source & cross platform**
Open source and supports Linux, Windows and an expanding set of OS’s

**Cloud managed**
Remotely configure, update, monitor, and manage IoT Edge devices

**IoT solutions**

**Real-time AI and analytics**

**Device connectivity and management**
Azure IoT Edge deployment

- Sensor (ex: camera)
- Data Box Edge
- Azure IoT Hub (ex: Stream Analytics, Machine Learning)
- Azure services (ex: data conversion)
- Third Party services (ex: data conversion)
- Custom code (ex: business logic)

Containers:
- DEPLOYMENT MANIFEST
- CONTAINER
- CONTAINER
- CONTAINER

Device configuration & management
Storage Gateway and IoT Message integration

Data Box Edge

Edge compute

Local share

Cloud share

Storage Gateway

Azure Storage
Getting started with IoT Edge

Many Azure services offer IoT Edge modules

- Azure Functions
- Azure Machine Learning
- Azure Steam Analytics
- Azure Cognitive Services
- AI Toolkit
- SQL Database Edge

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**Or write your own:**

Modules are simply containers. Visual Studio and VSCode have tools available and language support includes:

- C#
- C
- Node.js
- Python
- Java

**Get started here:**

https://docs.microsoft.com/en-us/azure/iot-edge/
Using compute at the Edge to manage data

Aggregate
Combine or standardize data from different sources into the format you want for cloud storage and archiving as part of your upload pipeline

Modify
Remove data that for legal or compliance reasons can’t be stored in the cloud, e.g., personally identifying information

Filter
Sensors and devices can generate huge amounts of data, but often most of that data is repetitive and uninteresting. Identify the important data you want in the cloud for further processing or long-term storage and discard less important data
Using ML at the Edge on Data Box Edge

Process at Edge for immediate results
Process images and video as they are generated for immediate results. Drone video footage can be analyzed in the field, or quality control issues can be identified right at the factory before the product hits the market.

Filter with AI analysis at Edge
Constantly monitor traffic camera feeds to detect collisions or “near collisions” and store one minute of video around these events for human analysis and model training. Retrain in cloud and send updated model to edge.

Remove sensitive data at Edge
Automatically blur PII data, e.g., faces or license plates, from images and video before they are uploaded and archived in Azure, protecting against privacy issues if you have a legal requirement around storing PII in the cloud.
Sunrise Technology, a division of Kroger, uses Data Box Edge to enhance Retail-as-a-Service platform

- Live video analytics on Data Box Edge at the retail stores
- Enables personalized and guided shopping experiences such as at-shelf product recommendations
- Improves employee productivity by identifying out-of-stocks quickly
Esri uses Data Box Edge to improve effectiveness of field teams during disaster response

- Field teams collect imagery, process it on Data Box Edge locally, and turn it into updated maps
- Responders use updated maps to coordinate response efforts even when completely disconnected from the command center
“Many of my clients have systems already generating video and sensor data at the edge which isn’t practical to move to the cloud. Data Box Edge lets me bring processing power and machine learning tools to where the data is. As we process this previously unused data it’s unlocking new business opportunities for those clients.”

Shri Bhupathi
Founder, Technical Fellow
Data Box Edge with IoT Edge and FPGA or GPU for accelerated ML

**SENSORS**

- Arm
- Airplane
- Camera
- Car

**DATA BOX EDGE**

- IoT Edge modules
- Azure ML with NVIDIA GPUs or FPGA
- Local storage
- Data Box Edge has an FPGA powered by Azure Machine Learning or NVIDIA GPUs for accelerated ML inferences at the Edge
- Data Box Edge has fast local storage, optimized network transfer, and a storage gateway to extend Azure Storage to the edge

**AZURE CLOUD**

- IoT messages
- IoT Hub
- Push updated model to Edge
- Azure Storage (Block, page, and files)
- Retrain model in cloud with uploaded data
Cloud managed
Cloud managed

Fully managed from the Azure portal. Configure your system, monitor health, and install updates from the cloud.
Availability

Data Box Edge and Data Box Gateway service is available in US East, West Europe, and SE Asia
Used for provisioning, monitoring, and updating

Data can be transferred to any public cloud region
Shares connect to a storage account, regardless of the region the appliance resource is in

Data Box Edge availability
Devices are available in the North America, European Union countries, Australia, South Africa and Singapore, Taiwan and others. More regions coming soon as we expand availability.
### Data Box Edge specifications for FPGA

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>2x10 core Intel Xeon CPUs,</td>
</tr>
<tr>
<td>RAM</td>
<td>128 GB</td>
</tr>
<tr>
<td>Local cache capacity</td>
<td>12 TB NVME flash storage</td>
</tr>
<tr>
<td>Cloud capacity</td>
<td>10 PB</td>
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<tr>
<td>Data protection/security</td>
<td>AES 256-bit encryption</td>
</tr>
<tr>
<td>Form factor</td>
<td>1U rack mount server, 29.6&quot; deep</td>
</tr>
<tr>
<td>Network interface</td>
<td>4x25 GbE SFP+, 2x1 GbE</td>
</tr>
<tr>
<td>Accelerated ML</td>
<td>Intel® Arria® 10 FPGA powered by Azure Machine Learning</td>
</tr>
<tr>
<td>Power</td>
<td>110/240 (50/60 Hz)</td>
</tr>
</tbody>
</table>

Data Box Edge Specifications for GPU to be announced soon...
Available now

Go to https://aka.ms/databox-edge to order on the Azure portal

Data Box Edge: Click sign up to register and we’ll follow up with you

Data Box Gateway: Get started today by downloading a VM image
Thank you
### Data Box Gateway minimum requirements

<table>
<thead>
<tr>
<th>Specification</th>
<th>Minimum requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypervisor support</td>
<td>Hyper-V 2012R2 or above VMware 6 or above</td>
</tr>
<tr>
<td>Minimum CPU cores</td>
<td>4</td>
</tr>
<tr>
<td>Minimum RAM</td>
<td>8GB</td>
</tr>
<tr>
<td>OS disk size</td>
<td>250GB</td>
</tr>
<tr>
<td>Minimum data disk size</td>
<td>2TB</td>
</tr>
<tr>
<td>Network interfaces</td>
<td>At least 1</td>
</tr>
<tr>
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Introducing Azure Data Box Edge

An AI-enabled Edge computing appliance with network data transfer capabilities

- **Network Storage Gateway**: Network data transport to Azure while retaining local access to files
- **Edge compute/data preprocessing**: Use IoT Edge compute modules to analyze, filter, and transform data as it moves to Azure
- **FPGA powered by Azure Machine Learning**: Accelerate ML inferencing of images and video streams to get results close to the data source
- **Cloud managed**: Easily manage your fleet from the Azure portal
Data Box pricing for online solutions

<table>
<thead>
<tr>
<th></th>
<th>Data Box Gateway</th>
<th>Data Box Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td>US</td>
<td>EU¹</td>
</tr>
<tr>
<td><strong>Monthly subscription fee</strong></td>
<td>$125/month</td>
<td>€106/month</td>
</tr>
<tr>
<td><strong>Device shipping</strong></td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

1. Euro prices based on current exchange rates and may vary
2. Starting shipping price. May be higher depending on carrier, and shipping options
**Azure Data Box Edge**

An AI-enabled edge computing appliance with network data transfer capabilities

- **Network storage gateway**
  Simple network data transport to Azure while retaining local access to files

- **Edge compute**
  Use IoT edge compute modules to analyze, filter, and transform data as it moves to Azure

- **FPGA powered by Azure Machine Learning**
  Accelerate ML inferencing of images and video streams to get results close to the data source

- **First-party from Microsoft**
  Acquire and manage your appliance from the Azure portal as part of a monthly meter

**Azure Data Box Gateway**

A virtual network appliance that moves data in and out of Azure

- **Network storage gateway**
  Simple network data transport to Azure while retaining local access to files

- **Virtual machine**
  Runs as a Hyper-V or VMware virtual machine on your hardware

- **Cloud managed**
  Easily manage Data Box Gateway and Data Box Edge from the Azure portal
Enabling an Intelligent Cloud and Intelligent Edge