



# How the PI System Enables Edge Computing Virtually Anywhere

Presented by **Tyler Duncan --- DELL EMC**  
**Scott Robertson --- OSISoft, LLC**



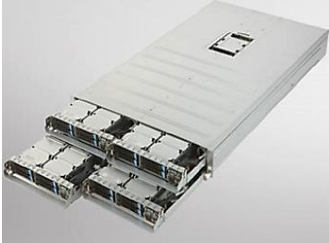
# Agenda

- Introduction of Dell EMC's Modular Data Centers
- Challenge of Edge Computing
- Dell's MDCi
- Architecture
- Implementation

# Introducing Extreme Scale Infrastructure (ESI)

Built on customer-centric needs

TAILORED  
OFFERINGS



Flexibility built  
around customer  
needs

GLOBAL  
CAPABILITIES



Deploy anywhere  
with confidence

MODULAR DATA  
CENTERS



Fast, efficient, cost-  
effective capacity

CUSTOMER  
SPECIFIC  
OFFERINGS



Tailored solutions to  
address unique  
needs

ESI PRODUCT  
PORTFOLIO



Purpose-built  
solutions w/  
minimalistic designs

# Dell EMC Modular Data Centers (MDCs)

Data center capacity delivered with the speed, quality & efficiency of IT

## ADAPTIVE



Proven effectiveness  
in a wide range of  
environmental  
conditions  
(cold/dry hot/humid)

## FLEXIBLE



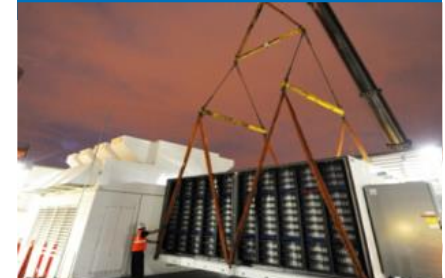
Flexible solutions for  
different environments  
Indoor/Outdoor  
100% free-air or closed-  
loop mechanical cooling

## HIGHLY AVAILABLE



Concurrent serviceability  
and dual power feeds to  
meet uptime requirements

## EXPERIENCED



More than 300 MDCs  
deployed

# Dell EMC modular solutions timeline



Humidor



Epic



Micro MDC

2008

2011

2013

2015

2016

Fat Tire



Flex Module



# Dell EMC MDC industry-leading accomplishments



**300+**  
Dell EMC MDC  
solutions in production



**>130** MW  
Total power capacity of critical  
IT load in Dell EMC MDCs



**>10** billion  
Total operational server-hours in  
Dell EMC outside-air-cooled MDCs



**>500** K  
Servers installed in Dell EMC MDCs

# Challenge: The age of the consumer is NOW!



Everything and everyone is digitally connected.

From devices to appliances to wearables to driverless cars.

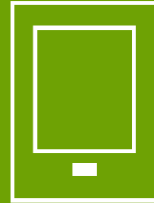


IDC estimates

**80** there will be **BILLION**

IoT connected endpoints by

**2025\***



IDC says the amount of **DATA** that will be **CREATED** by **2025** will exceed

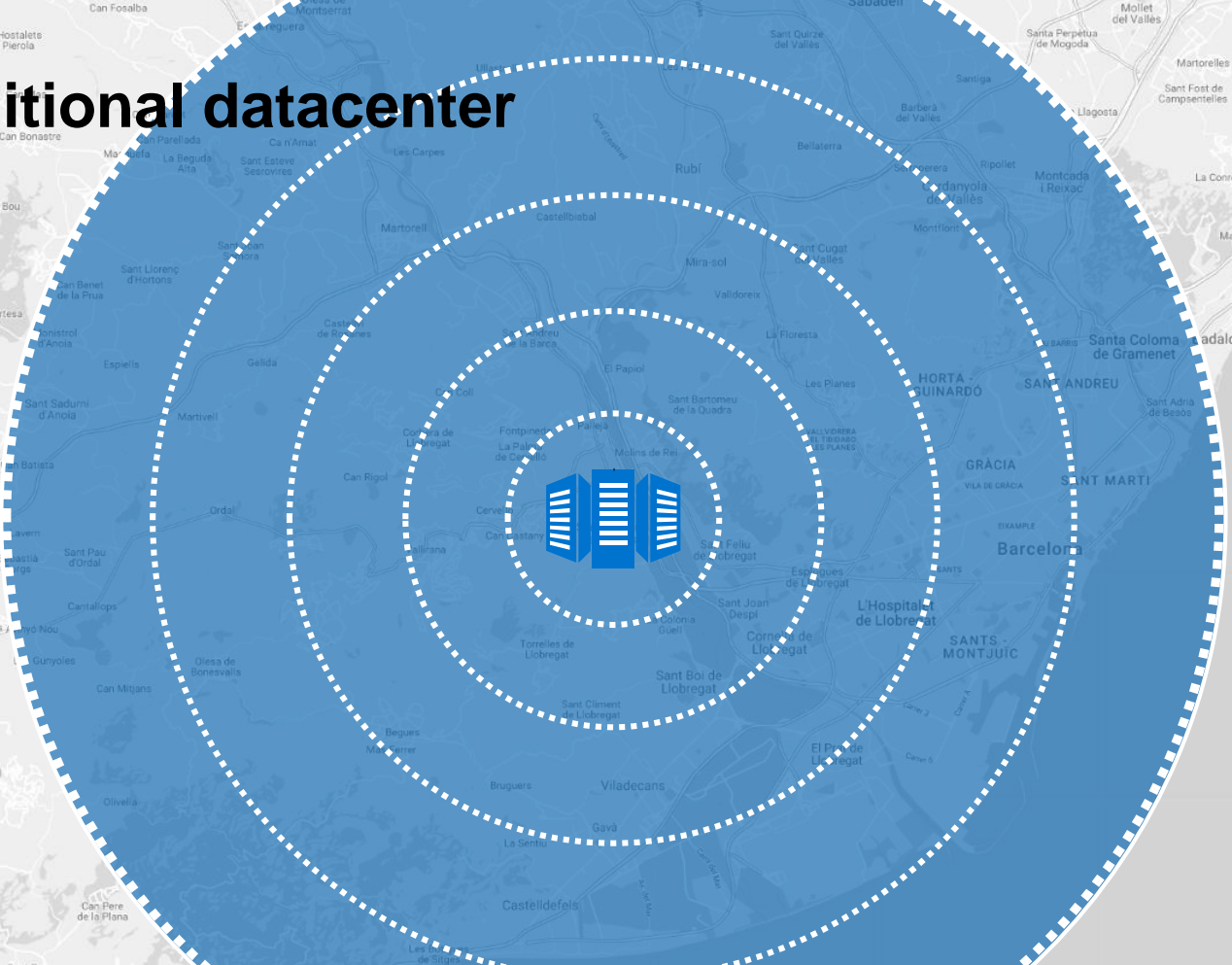
**162** Zettabytes\*



\*IoT: "The Edge" Goes Mainstream - Carrie MacGillivray, Vice President, IoT & Mobility, IDC



# The traditional datacenter

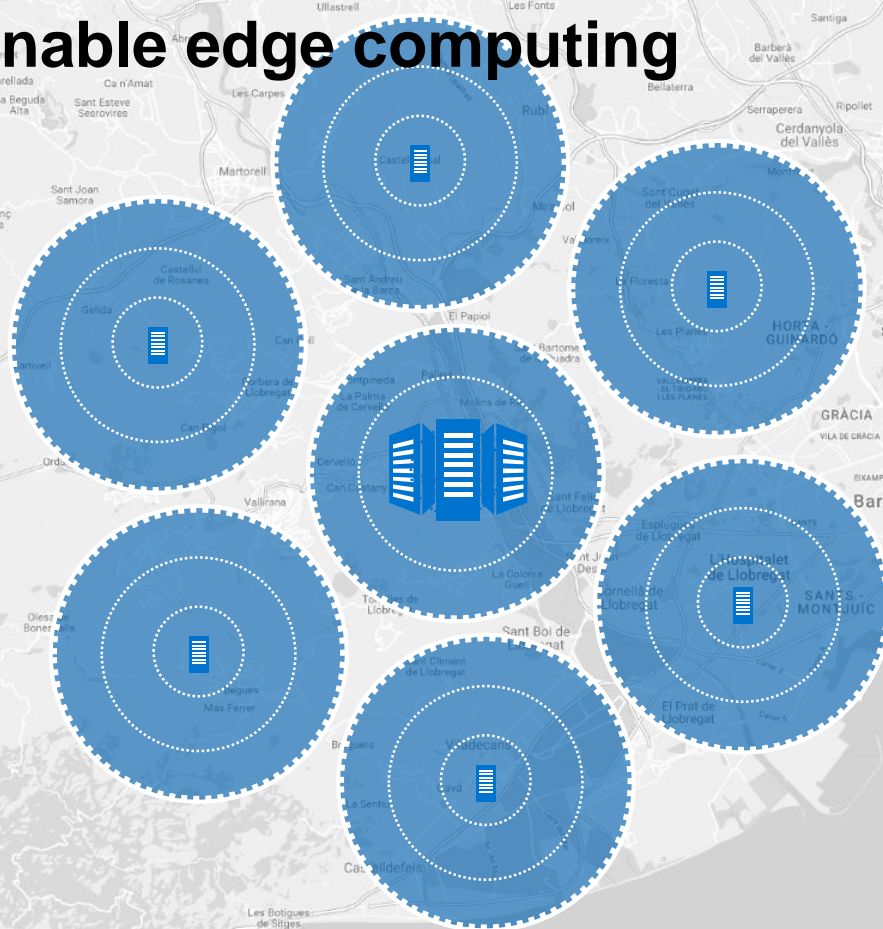




# Micro MDCs enable edge computing



# Micro MDCs enable edge computing



- Driven by IoT, content-on-demand and big data, edge computing puts data centers **CLOSER TO THE USER.**
- This allows information to be **ACCESSED FASTER.**
- Service providers can see massive **PERFORMANCE IMPROVEMENTS** while creating new **SERVICE AND REVENUE OPPORTUNITIES.**

# Dell EMC micro MDCs provide the flexibility service providers need



## CUSTOMIZABLE

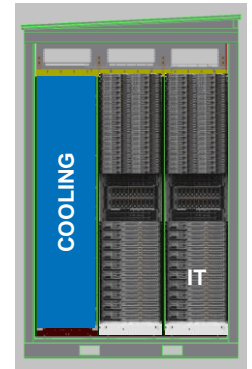
Dell EMC micro MDCs can be **tailored** to a variety of configurations and workloads based on customer needs



Low density  
Includes power elements  
& UPS back-up



Medium density  
Includes power elements  
& UPS back-up



High density  
All power elements  
sourced from facility

# Dell's MDCi

## Single Pane of Glass – IT and Facility Infrastructure

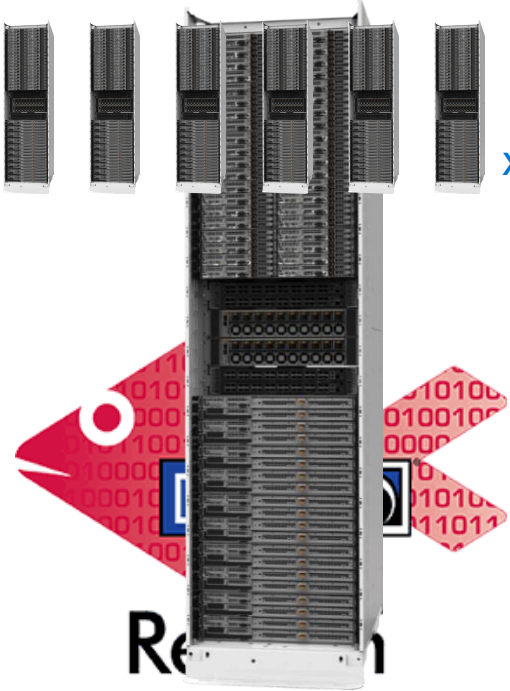


# Management

- Easy to Deploy, Easy to Maintain

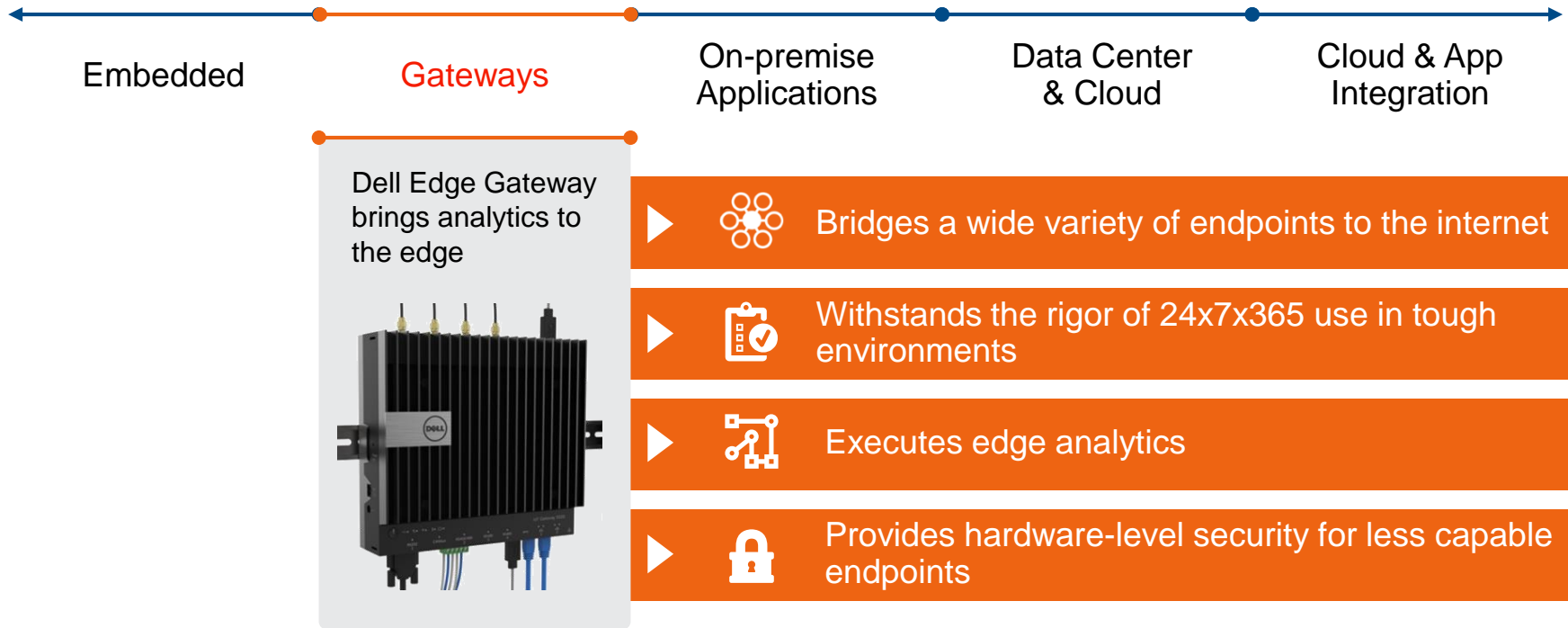


- Vendor Agnostic
- Rack Level Management





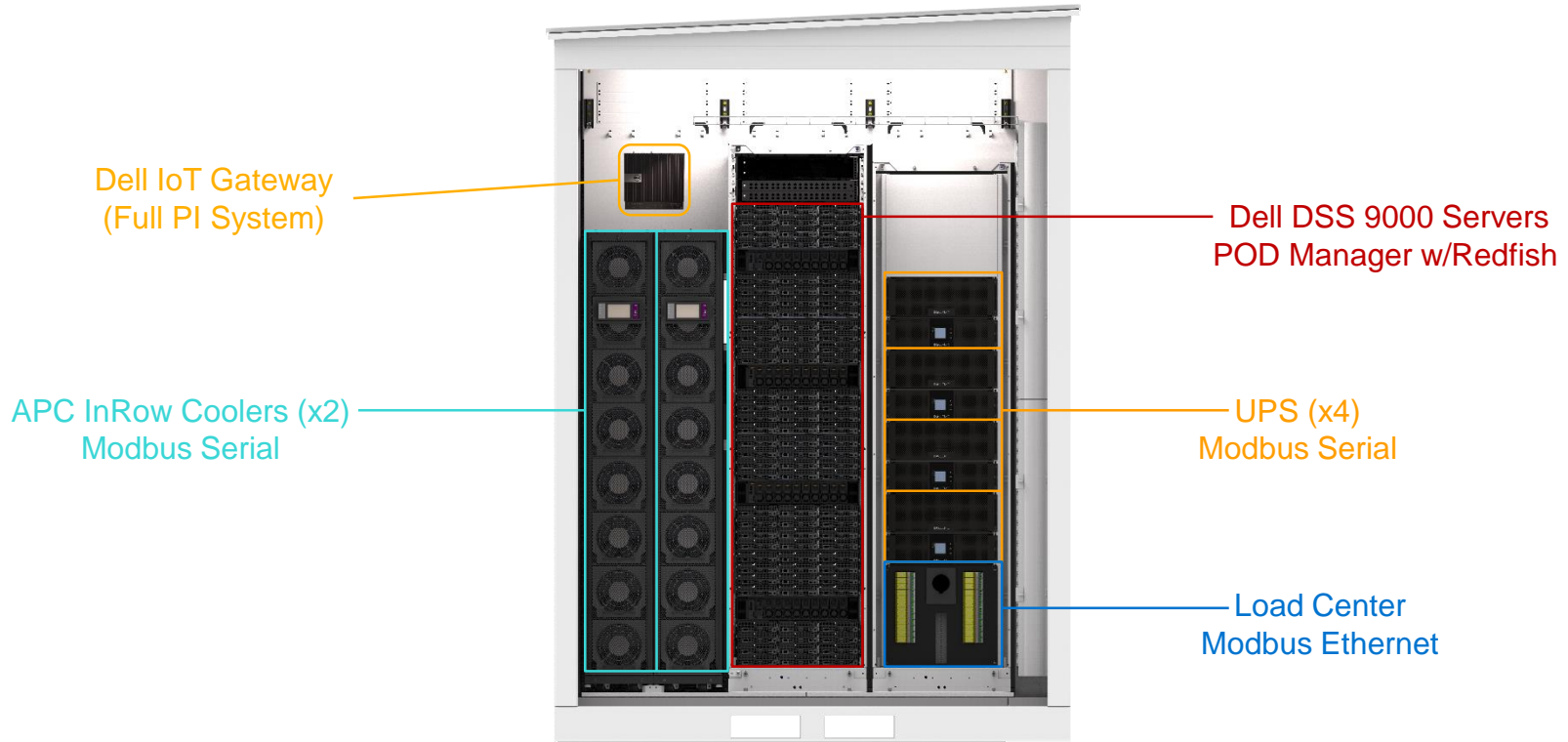
# The leading infrastructure provider for enterprise IoT

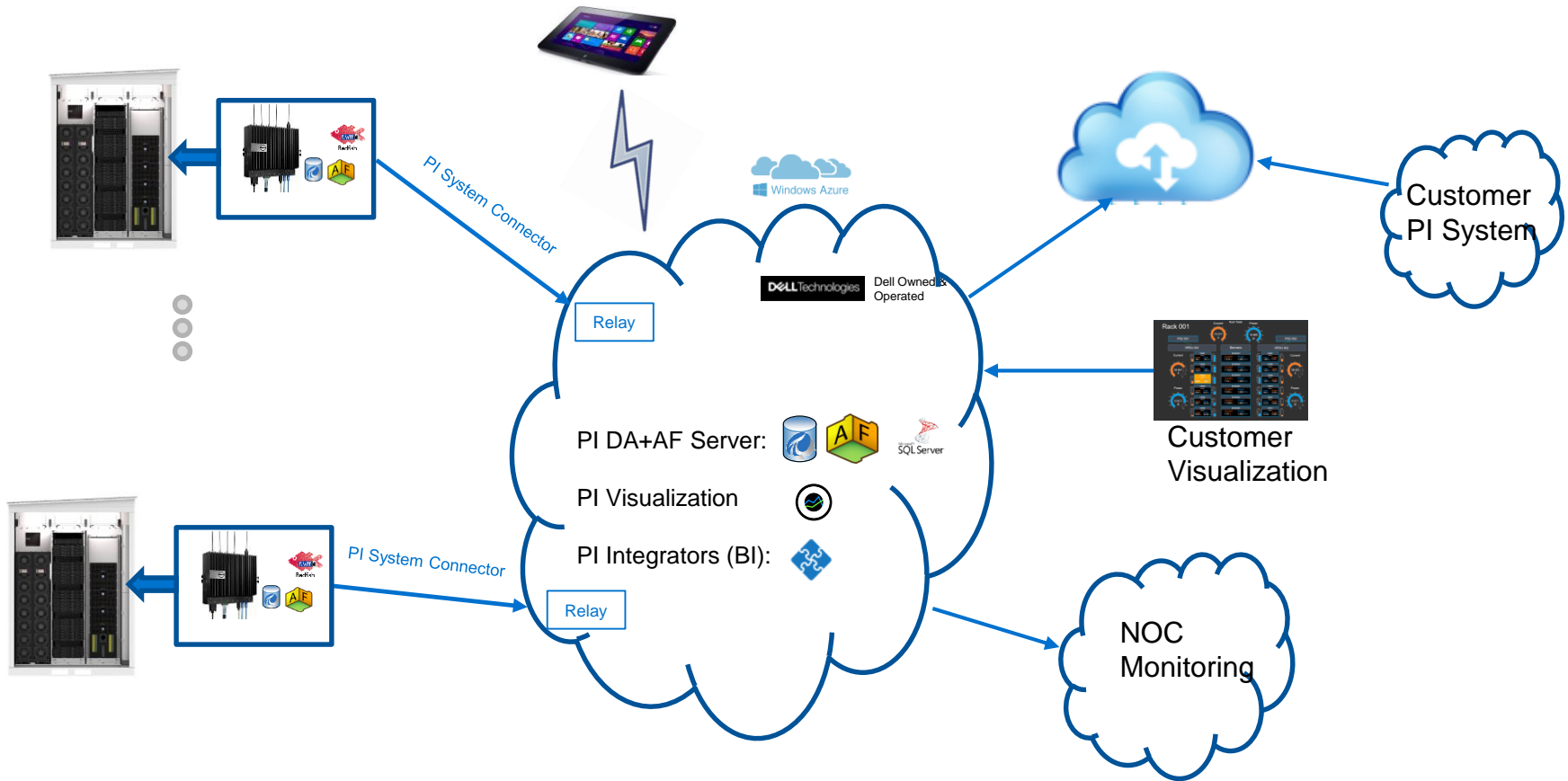




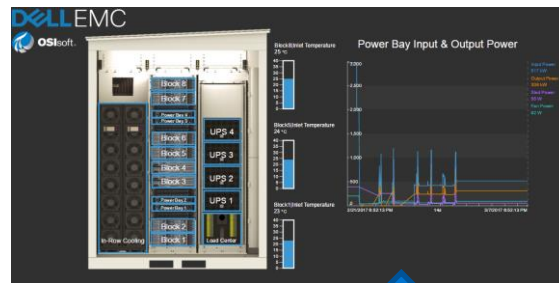
# Architecture







- PI System installed on DELL 5100 gateway
  - Microsoft Windows 10 IoT Enterprise
  - 2 Core, 4 GB RAM
  - Asset Framework w/Analytics
  - Data Archive
  - SQL Express
  - REDFISH Connector (Beta)
- MODbus Serial Interface
- MODbus Ethernet Interface
- PI System Connector (Beta)
- PI Connector Relay (Beta)
- AF Asset Mapping (Alpha)



# Table Driven Templates – Just add Assets

**Create/Update Reference**

Operations Completed: 26

Processing Element 'UPS\_1'.  
Succeeded: creation or update of Attribute 'Battery Capacity'.  
Succeeded: creation or update of Attribute 'Battery Support'.  
Succeeded: creation or update of Attribute 'Input A Phase Current'.  
Succeeded: creation or update of Attribute 'Input A Phase Power Factor'.  
Succeeded: creation or update of Attribute 'Input A Phase Voltage'.  
Succeeded: creation or update of Attribute 'Input B Phase Current'.  
Succeeded: creation or update of Attribute 'Input B Phase Power Factor'.  
Succeeded: creation or update of Attribute 'Input B Phase Voltage'.  
Succeeded: creation or update of Attribute 'Input C Phase Current'.  
Succeeded: creation or update of Attribute 'Input C Phase Power Factor'.  
Succeeded: creation or update of Attribute 'Input C Phase Voltage'.  
Succeeded: creation or update of Attribute 'Input Frequency'.  
Succeeded: creation or update of Attribute 'Input Voltage State'.  
Succeeded: creation or update of Attribute 'Output A Phase Active Power'.  
Succeeded: creation or update of Attribute 'Output A Phase Current'.  
Succeeded: creation or update of Attribute 'Output A Phase Load Percent'.  
Succeeded: creation or update of Attribute 'Output A Phase Voltage'.  
Succeeded: creation or update of Attribute 'Output B Phase Active Power'.  
Succeeded: creation or update of Attribute 'Output B Phase Current'.  
Succeeded: creation or update of Attribute 'Output B Phase Load Percent'.  
Succeeded: creation or update of Attribute 'Output B Phase Voltage'.  
Succeeded: creation or update of Attribute 'Output C Phase Active Power'.  
Succeeded: creation or update of Attribute 'Output C Phase Current'.  
Succeeded: creation or update of Attribute 'Output C Phase Load Percent'.  
Succeeded: creation or update of Attribute 'Output C Phase Voltage'.  
Succeeded: creation or update of Attribute 'Output Frequency'.  
Configuration creation or update of 26 attributes completed.

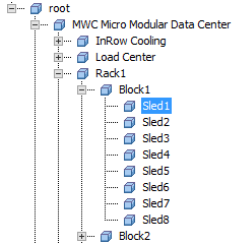
Close

UPS Display

UPS Number 180 67.0

Factor	Span	Display Digits	Excep Dev	Comp Dev
	300	1	0.1	0.2
	300	1	0.1	0.2
	300	1	0.1	0.2
	100	1	0.1	0.2
Factor	2000	1	0.1	0.2
	2000	1	0.1	0.2
	2000	1	0.1	0.2
	100	2	0.01	0.02
	100	2	0.01	0.02
	100	2	0.01	0.02

# Asset Mapping

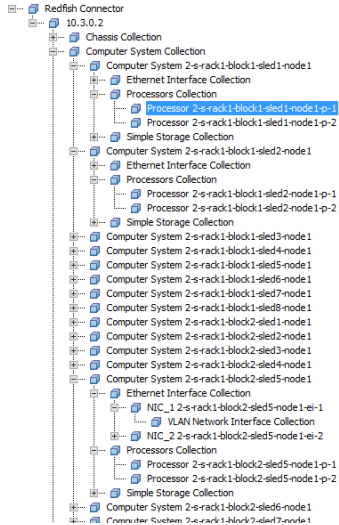


Memory	8GB	1/1/1970 12:00:00 AM
Model	Intel(R) Xeon(R) CPU E5-2630 v4 @ 2.20GHz	1/1/1970 12:00:00 AM
Power	150W	3/2/2017 12:08:09.138 AM
Processor Speed	2.2 GHz	1/1/1970 12:00:00 AM
QTY Drives Full Sled	12	1/1/1970 12:00:00 AM
QTY Drives Half Sled	1	1/1/1970 12:00:00 AM



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Name	Value
Block	block1
Effective Family	
Effective Model	
Id	2-s-rack1-block1-sled1-node1-p-1
Identification Registers	
Instruction Set	x86-64
Manufacturer	Intel
MaxSpeedMHz	0
MicrocodeInfo	
Model	Intel(R) Xeon(R) CPU E5-2630 v4 @ 2.20GHz
Odata Context	/redfish/v1/Systems/2-s-rack1-block1-sled1-node1/P...
Odata Id	/redfish/v1/Systems/2-s-rack1-block1-sled1-node1/P...
Odata Type	#Processor.v1_0_0.Processor
Processor Architecture	x86
Processor Type	Unknown
Rack	rack1
Sled	sled1
Socket	CPU.Socket.1
Status Health	Warning
Status State	StandbyOffline



# Single Pane of Glass – From anywhere



## What's Next?

- Slim down and streamline PI System Deployment
- Develop standard AF Models and templates
- Expand use cases for real-time Analytics
- Develop customer portals
- Remote management
- BI Analysis
- NOC Integration



# Contact Information

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Solution Architect

OSIsoft, LLC

## Questions

Please wait for the **microphone** before asking your questions



State your **name & company**

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