# **Intelligent** Storage Systems

## Rugged, High-Capacity Computational Storage Solutions

Designed, developed, manufactured, assembled, and supported in the United States.

High-performance storage systems that satisfy multiple security requirements and enhance integrity and upgradability of defense systems in the most hostile environments in real-time, at the tactical edge.

Next-Gen Storage Systems

# Speakers

We look forward to presenting and answering your questions.

**Yazz Krdzalic**

Director of Marketing & Business Development

*Trenton Systems*

**Scott Shadley**

VP of Marketing

*NGD Systems*


Trenton Systems

# Ruggedized HPC Solutions

Rugged, high-performance computing customized to match the demands of your program or application. Quickly deployable and ready to tackle your real-time computing needs. Agile, hardened, and built to serve at the tactical edge.

# Computational Storage Devices

Listening to Customer Requirements and delivering solutions that provide NVMe SSDs with In-Situ Processing to drive compute capability at the storage device. This unites NVMe SSD storage and compute to satisfy the growth of Edge, Datacenters and Accelerate AI Workload Deployments.

NGD Systems

TRENTON SYSTEMS®

SECURITY IS AT OUR CORE

Trenton Systems innovates trusted computing solutions for military, industrial, and commercial sectors.

# SECURITY is at our core

Fortified to protect from physical harm and cyber-secured to thwart digital threats. Ensure uptime, availability, and accessibility with long-life, future-proof technologies no matter where your mission takes you.

SECURE. POWERFUL. READY TO CRUSH THE STATUS QUO.

- E2E Solutions
- Ruggedized
- Cutting-Edge
- Certified
- Long-Life
- Field-Proven
- Hardened
- USA-made

# In-House Control.

We set the bar for security, integrity, protection, reliability, mitigation and inspection of all Trenton Systems solutions.

Revision control, EOL and LTB notices, unique system build number that only belongs to you, in-house support team.

Secure OS and Hypervisor

Hardware enhanced security: Intel PFR, SGX, TME, Secure Boot, AES, SHA and RSA/DH encryption, custom/configurable BIOS, etc.

Trusted sources, TAA compliant, CMMC Level 3, NIST, DFARS, CFR, and others.


intel IoT Solutions Alliance


# COTS or Custom

## Configurable Off-The-Shelf Servers & Custom HPCs

A global force in customer-driven, US-made computing solutions for numerous critical defense platforms. Innovative, tactical, and secure servers offer system-wide security, which increases the interoperability with current or future applications and protects the most valued asset when it matters most: *your data*.

Next-Gen Storage Systems

## Field-Proven Technologies

- Edge Servers & Workstations
- Blade Servers
- Embedded PCs
- NVMe Storage
- PCIe Expansion
- Integrated Rack Solutions
- System Components
- Custom Designs

# NVMe Storage

NVMe JBOF Systems capable of storing critical data that you can access at 27.2GB/s, replace in a flash, and guard from unwanted access with next-gen computational storage drives.

**Hot-Swap**

**Throughput**

**Quick replace**

High-capacity storage system with compute capability per drive for improved performance.

27.2GB/s read & write speeds...

24EVO

# JBOD Storage Array

## 24 **individually-removable** U.2 NVMe SSDs.

Native PCIe interconnect delivers lightning-fast data throughput to any server.

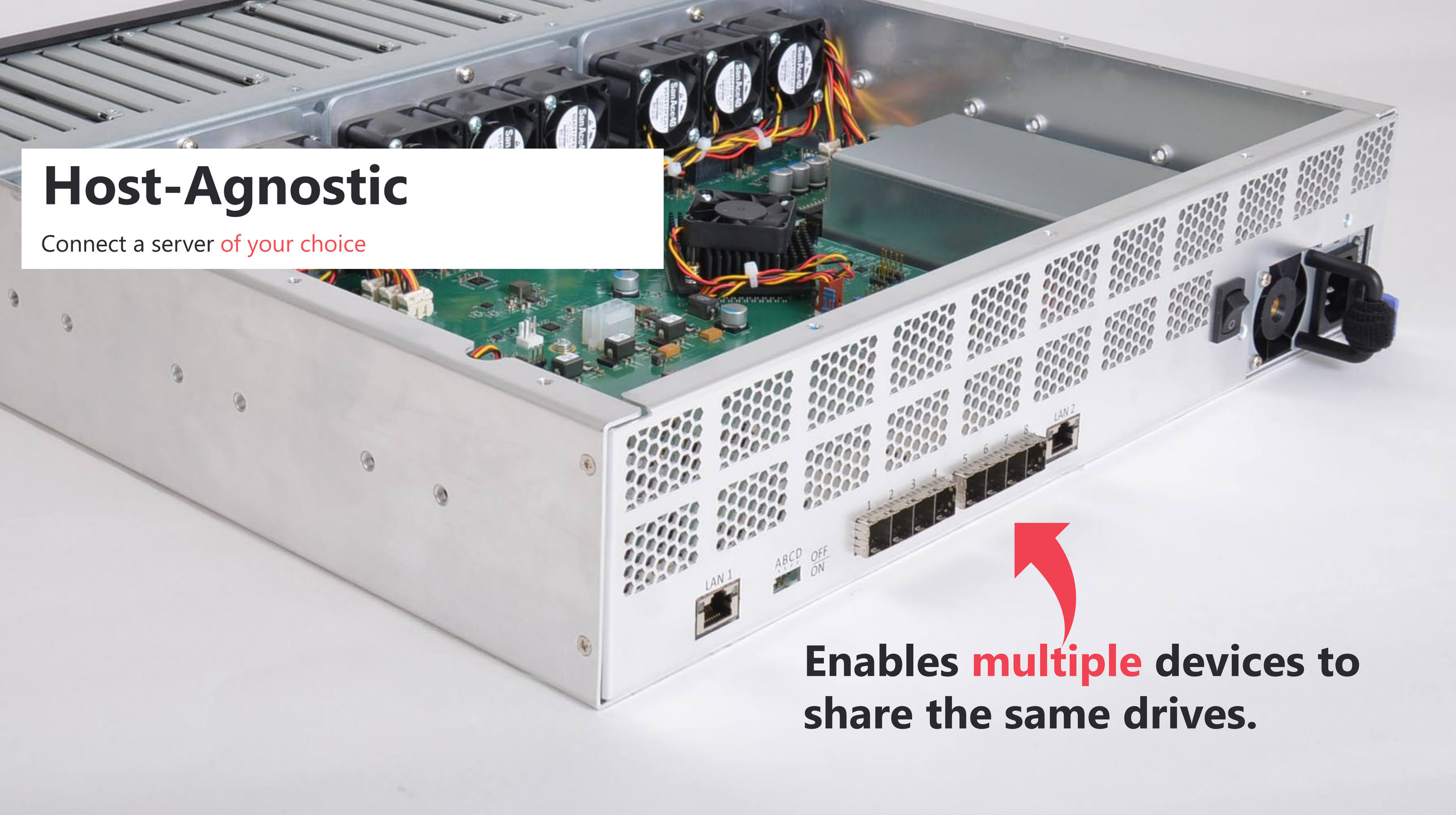
# 3MAG JBOD Array

Retrieve, replace, and continue - the first JBOD array that maximizes your storage capabilities in the field and allows you to remove 8 NVMe drives at once!

The ultimate hot-swap storage solution on the market today.

Grab a hold of one of the three drive magazines, pull 8 drives out in an instant and replace it with another 8 drives just as fast.

Tool-less
Pain-less
Super-fast




# Host-Agnostic

Connect a server of your choice

**Enables multiple devices to share the same drives.**


# Embedded PCs for Space-Constrained Programs

Highly configurable, ultra compact embedded systems platforms designed for mobility and suitable for operation in tough environments. Densely packed with the latest Intel Core processors that feed off high-frequency SODIMMs and are supported by the latest SATA and NVMe storage options. Front and rear high-speed I/O give you the flexibility you need to ensure parity with your existing infrastructure. A small form factor powerhouse that fits in the palm of your hand.

Unpack. Plug in. GO TIME!

intel INSIDE

The ION Mini PC utilizes the latest Intel® processor technology.

# Packed with features

- 6 USB ports
- 3 GbE LAN ports
- M.2 NVMe x4 PCIe
- 2.5” SATA SSD
- Dual Displays
- Management port
- BIOS optimization
- On-board TPM 2.0

| Trenton Systems | vs. | Industry |
|---|---|---|
| 5-year warranty | | 2-year warranty |

Lifetime Support

In-house

# Computational Storage
# Innovative Intelligent NVMe SSDs

Driving Compute and Storage in Rugged Environments Without Compromise or Restriction – All Made in the USA

# The Market Needs a New Way to Look at Storage.

**Pain Points**

Physical Space

Available Power

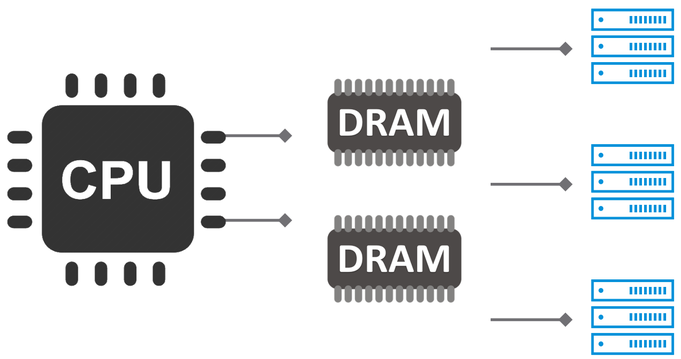
Scaling  Mismatch

Bottleneck Shuffle

Traditional storage architectures are in **trouble**.

Scaling requirements are **not met** with existing solutions

One CPU to many storage devices **creates bottlenecks**

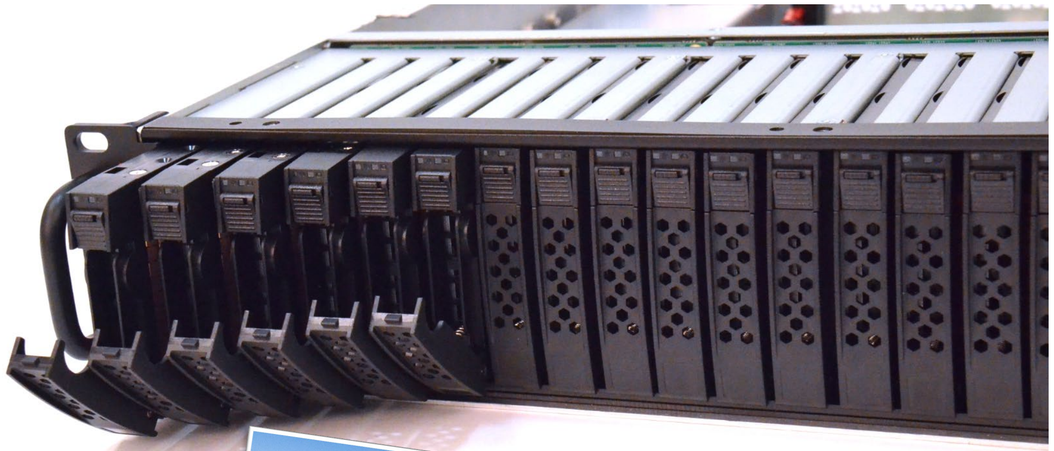


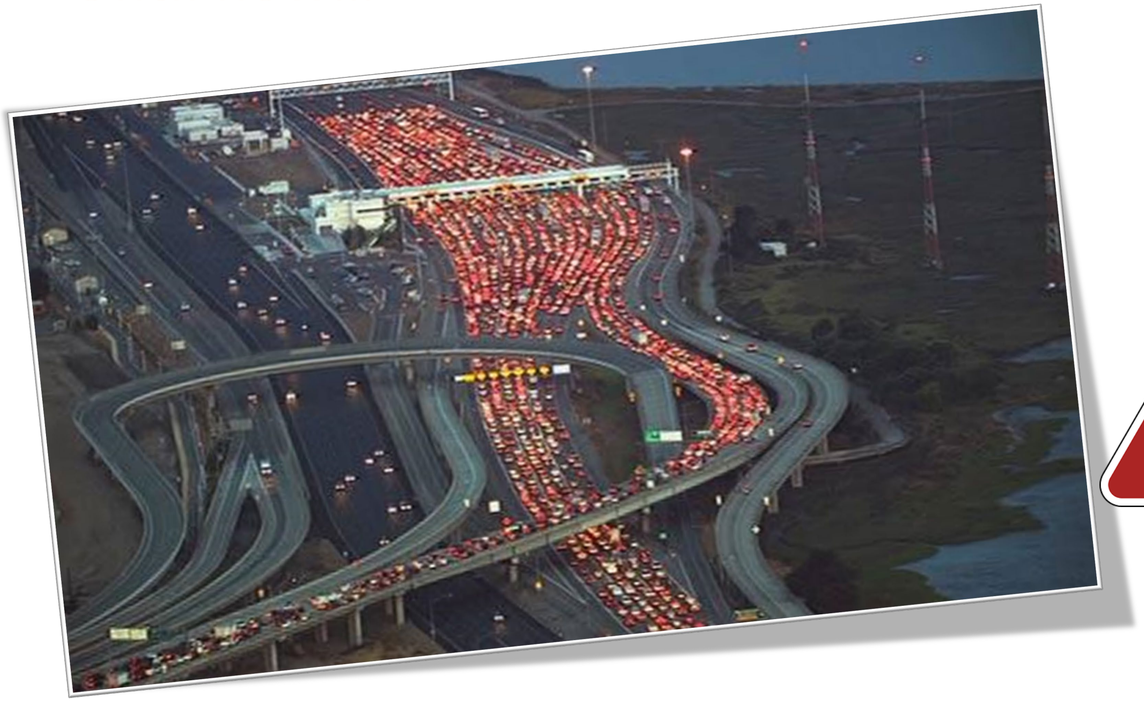

Technologies like '**NVMe-oF**' just move the bottleneck

A way to augment and support **without wholesale change** is needed

# What it Looks like Today with just NVMe. Room for More.

- **Trenton Systems has a Leading Edge NVMe JBOF…**
  - Great Storage capacity – 24 x 32TB – **768TB**
  - Local Look and Feel for Performance – **27GB/s**
- **But still has Bottlenecks**
- **Until now…**



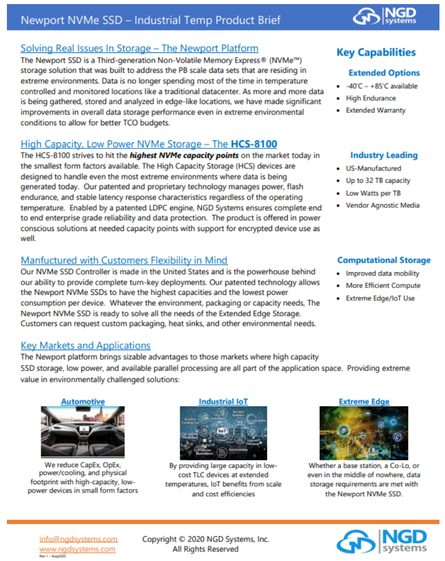


# NVMe Products as a Starting Point.

- **Largest capacity NVMe U.2 on the market**
- Large breadth of **SSD** solutions and capacity options
- Leading **W/TB** Energy Efficiency
- Encryption Support, FIPS Compliant

| Form Factor | Raw Capacity TLC (TB) | MAX Power (W) | Temp Range (‘C) |
|---|---|---|---|
| **U.2 15mm** | **up to 32** | **12** | **Commercial 0 – 60** |
| EDSFF E1.S | up to 12 | 12 | **Extended -10 – 70** |
| M.2 22110 | up to 8 | 8 | **Industrial -40 - 85** |

**U.2**
**Up to 32TB**

Newport NVMe SSD – Industrial Temp Product Brief

Solving Real Issues In Storage – The Newport Platform

The Newport SSD is a Third-generation Non-Volatile Memory Express® (NVMe™) storage solution that was built to address the PB scale data sets that are residing in extreme environments. Data is no longer spending most of the time in temperature controlled and monitored locations like a traditional datacenter. As more and more data is being gathered, stored and analyzed in edge-like locations, we have made significant improvements in overall data storage performance even in extreme environmental conditions to allow for better TCO budgets.

High Capacity, Low Power NVMe Storage – The **HCS-8100**

The HCS-8100 strives to hit the ***highest NVMe capacity points*** on the market today in the smallest form factors available. The High Capacity Storage (HCS) devices are designed to handle even the most extreme environments where data is being generated today. Our patented and proprietary technology manages power, flash endurance, and stable latency response characteristics regardless of the operating temperature. Enabled by a patented LDPC engine, NGD Systems ensures complete end to end enterprise grade reliability and data protection. The product is offered in power conscious solutions at needed capacity points with support for encrypted device use as well.

Manufactured with Customers Flexibility in Mind

Our NVMe SSD Controller is made in the United States and is the powerhouse behind our ability to provide complete turn-key deployments. Our patented technology allows the Newport NVMe SSDs to have the highest capacities and the lowest power consumption per device. Whatever the environment, packaging or capacity needs, The Newport NVMe SSD is ready to solve all the needs of the Extended Edge Storage. Customers can request custom packaging, heat sinks, and other environmental needs.

Key Markets and Applications

The Newport platform brings sizable advantages to those markets where high capacity SSD storage, low power, and available parallel processing are all part of the application space. Providing extreme value in environmentally challenged solutions:

Automotive

We reduce CapEx, OpEx, power/cooling, and physical footprint with high-capacity, low-power devices in small form factors

Industrial IoT

By providing large capacity in low-cost TLC devices at extended temperatures, IoT benefits from scale and cost efficiencies

Extreme Edge

Whether a base station, a Co-Lo, or even in the middle of nowhere, data storage requirements are met with the Newport NVMe SSD.

Key Capabilities

Extended Options

- -40°C – +85°C available
- High Endurance
- Extended Warranty

Industry Leading

- US-Manufactured
- Up to 32 TB capacity
- Low Watts per TB
- Vendor Agnostic Media

Computational Storage

- Improved data mobility
- More Efficient Compute
- Extreme Edge/IoT Use

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**M.2**

**EDSFF**

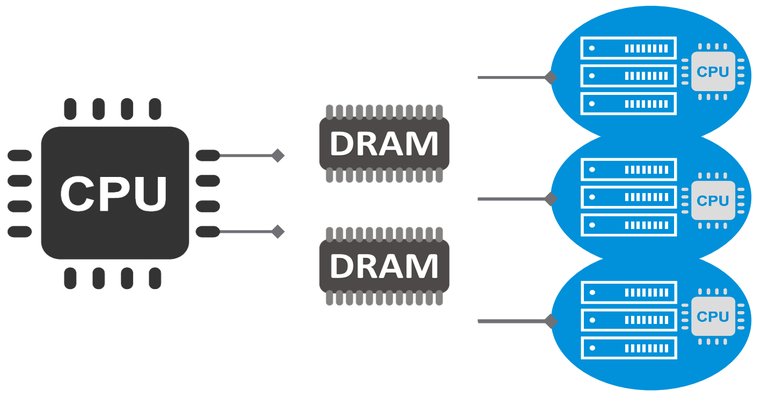
# The Market Solution Using Computational Storage.

## Value Add

- ✓ Distributed Processing
- ✓ Faster Results
- ✓ Lower Power
- ✓ Smaller Footprint

**Computational Storage** resources 'offload' work from the overtasked CPU

**Seamless** architectures create new 'servers' with each storage device added




This **'Server in every JBOF slot'** Architecture provides extreme value

**Additional CPU resources for the cost of Storage without need for CPUs**

# What it Can Be In Real-Life. Computational Storage.

- **Computational Storage Solution Adds Extreme Value**
  - Data Ingest can drive performance
  - Data Results can be mitigated locally
- **96 CPUs Per JBOF – Wait? Did you Hear that right??**
  - Secure Data in, Secure Results Out, any Environment

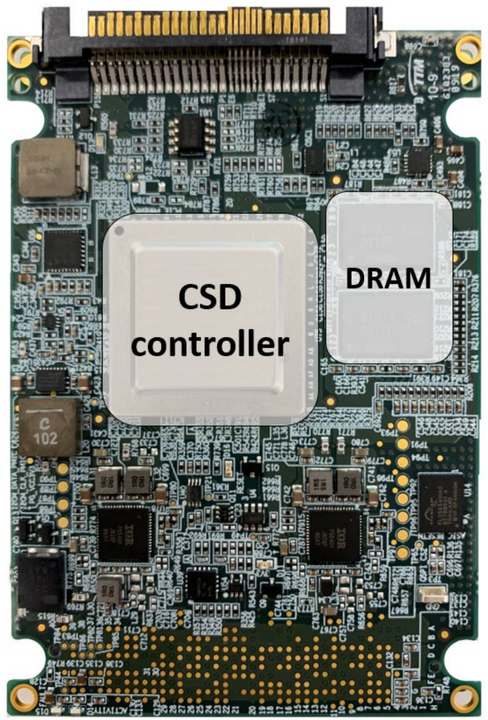


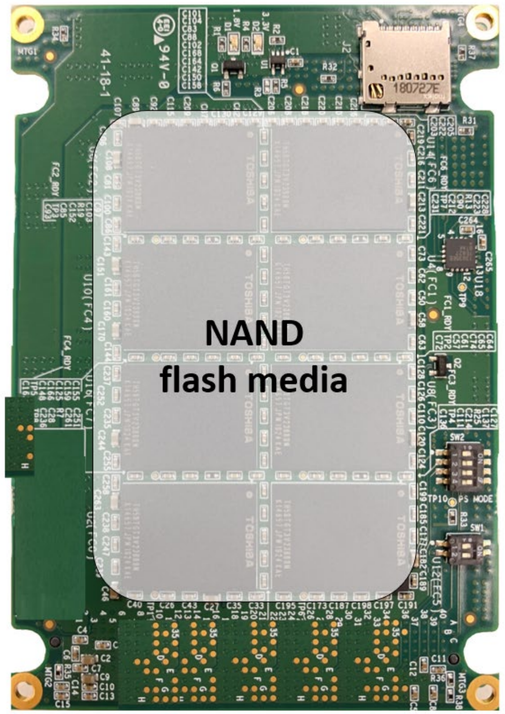
- **NO Change to System**
- **Plug-n-Play**
- **4 CPUs added per Drive**
- **Maximum Capacity**
  - Minimum Power

# Computational Storage Done Right - Simple.

- **Computational storage drive (CSD)**
  - Solid State Drive (SSD)
    - High capacity
    - Low power
  - Application processor
- **High-Capacity SSD**
- **In-Storage Processing Stack**

elastic PyTorch Parquet
TensorFlow mongoDB
docker kubernetes
Containers Microservices
AWS Greengrass Azure IoT Edge



# USE CASES

We are already working with Tier 1 & 2 companies on building the next-gen wave of storage systems.

# Innovative Computational Storage Uses.

SMART CITIES & AUTOMATION

EDGE GATEWAYS, MECs, SERVERS

VMware Tanzu

TensorFlow

APACHE TRAFFIC CONTROL

Azure IoT Edge

Linux


docker

hadoop

PyTorch

Parquet

bitfusion

AWS IoT Greengrass Core

Keras

GREENPLUM DATABASE

mongo DB

Caffe2

DATACENTERS & CDN DELIVERY

AUTONOMOUS ANYTHING

# ISTAR [Intelligence Surveillance Target Acquisition and Reconnaissance]


Sector: Military

Program: Aerospace & Defense

Application: Airborne

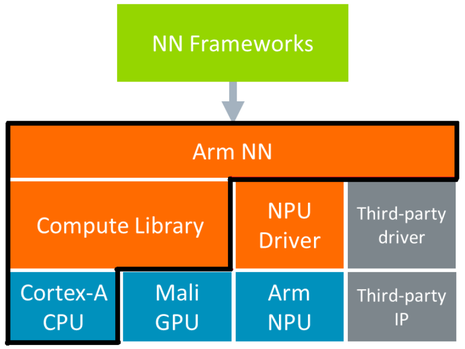
System setup:

- Three (3) JBOF systems holding 24x 32TB CSDs by NGD Systems
    - 2.3PB in a 6U configuration
- Host server with at least six (6) x16 PCIe slots (2U solution by Trenton Systems)
- Must provide the latest in data encryption at the edge

# Mission Critical Target Tracking and Identification.

- The output of application





# Radar Data Collection

**Sector**: Industrial

**Program**: Aerospace

**Applications**:

Transit Case, Radar Tower, Airfield

Whether the system is on the move or stationery, your data is protected against shock/vibe and any malicious activity at the edge, in real-time.

# Mission Critical Data Analytics from Any Source.



**Computational Storage**
**enabled SSD's do all the work**

DATA STORAGE SCIENCE

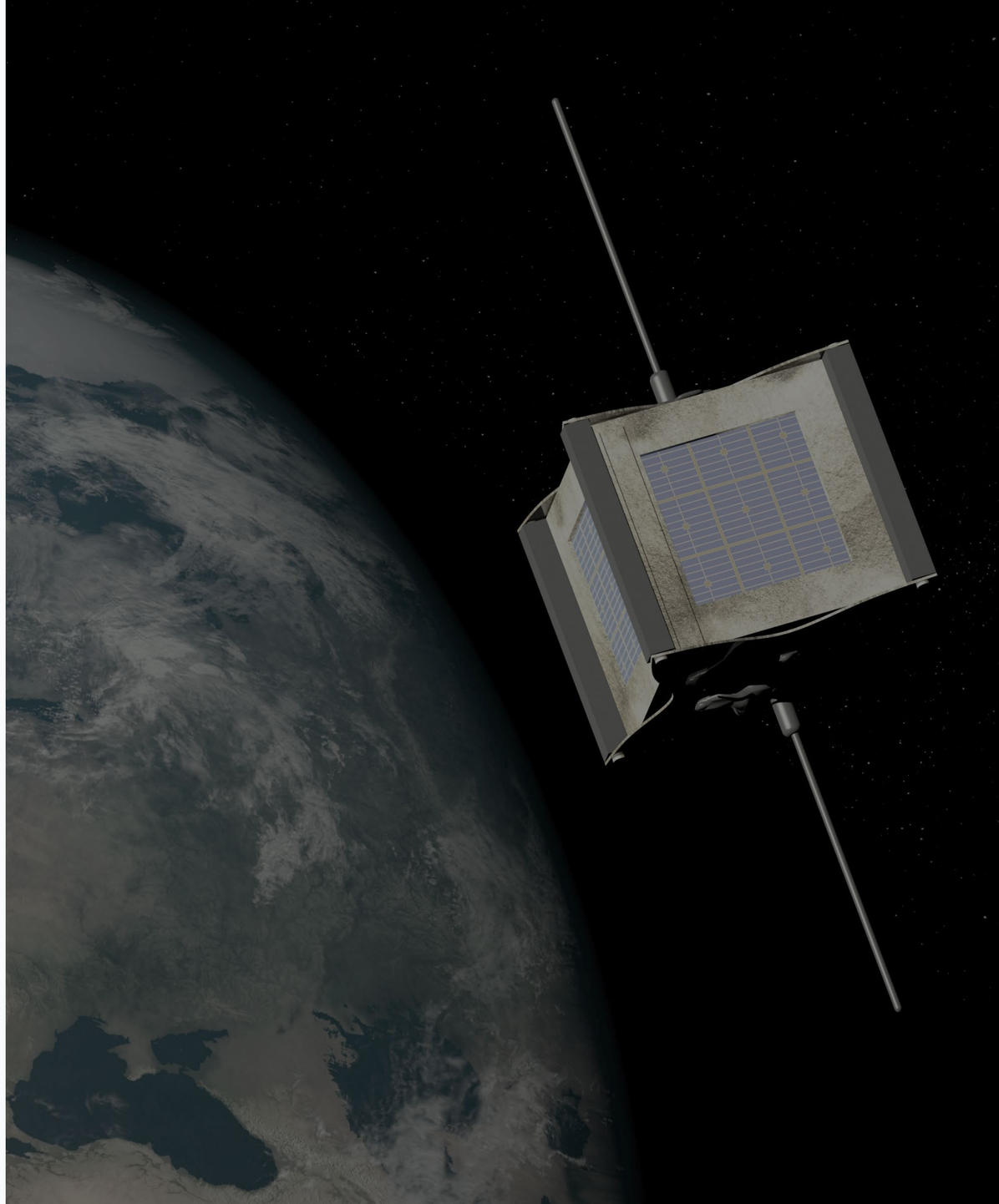
https://www.ngdsystems.com/Computational-Storage-adds-AI-to-eDiscovery

# Test Stations

The perfect end-to-end solution to quickly & securely collect and analyze data test after test.

**01. CubeSat**
**02. Autonomous Vehicles**
**03. Aircraft Engine Operation**
**04. Fuselage Balancing**

SFF to full rack mount server solutions to fit any use case of testing. Couple that with intelligent drives and you have unmatched performance at the edge, where you need it most.



# END to END Solutions with NGD and Trenton.

| | Ground/Home Location | In Flight Data Capture |
|---|---|---|
| 01. CubeSat | TRENTON SYSTEMS® NGD systems  |  NGD systems |
| 02. Autonomous Vehicles | TRENTON SYSTEMS® NGD systems  | TRENTON SYSTEMS® NGD systems  |
| 03. Aircraft Engine Operation<br>04. Fuselage Balancing | TRENTON SYSTEMS® NGD systems  | TRENTON SYSTEMS® NGD systems  |

# NVMe JBOF Computational Storage Server

- **Value**
  Impressive Capacity increase over other solutions
  Support of Computational Storage use cases
  **50% more storage per chassis**
  **20% overall system power reduction**
  **100% more processing power in the box**

- **Problem**
  U.2 NVMe drives from most vendors don't support ruggedized platforms, creating restricted use, or need to screen drives per system.
  In a fabrics-based system, having compute closer to data is becoming a challenge

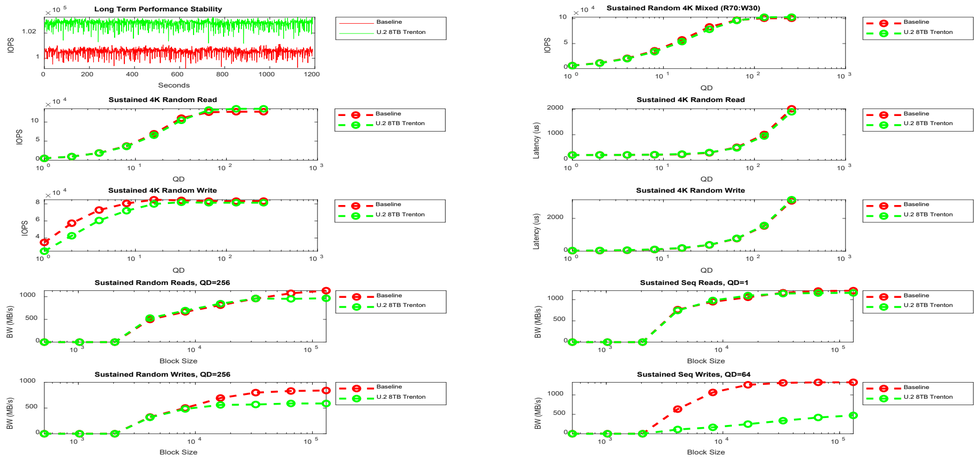
- **Solution**
  Achieve full server of high-capacity ruggedized drives, with added compute resource by using NGD Computational Storage

- **Implementation**
  Double the capacity per server, Reduce power draw on system, Decrease data security issues, increase data throughput

  Offer customers computational storage resources as an added value as a support feature for both Trenton Systems and NGD Systems



24 x 32TB – **768TB Total Capacity**
24 x 4 CPUs – **96 Computational Storage cores**



# A Partnership That Matters

Combined effort to support next-gen storage systems with NVMe computational storage drives to improve security, performance, and reliability.

Not just mission-critical, but safety-critical systems deployed all around the globe to serve processing applications with reliable and trusted US-made technology.

100%

**SECURITY & PROTECTION**

Fielded tactical edge servers that satisfy multiple mission-critical requirements coupled with intelligent drives for added security and performance.

MIL PRIMES

**TRUSTED PARTNERS**

All Tier-1 U.S. Defense Primes work with Trenton Systems & NGD Systems to provide secured and trusted, US-made, next-gen storage solutions.

39 + YEARS

**EXPERIENCE THAT COUNTS**

Over 31 years of ruggedized systems design and 8+ years of computational storage drive experience. Security is at our core.

# Thank you

We look forward to serving you on your mission.

A team that's one step ahead, so you're prepared today for the risks of tomorrow.

E2E SOLUTIONS

CONFIGURED JUST FOR YOU

ENCRYPTED SECURITY

HARDENED THROUGHOUT

AN ABUNDANCE OF OPTIONS

LOAD BALANCED