DDN 2018
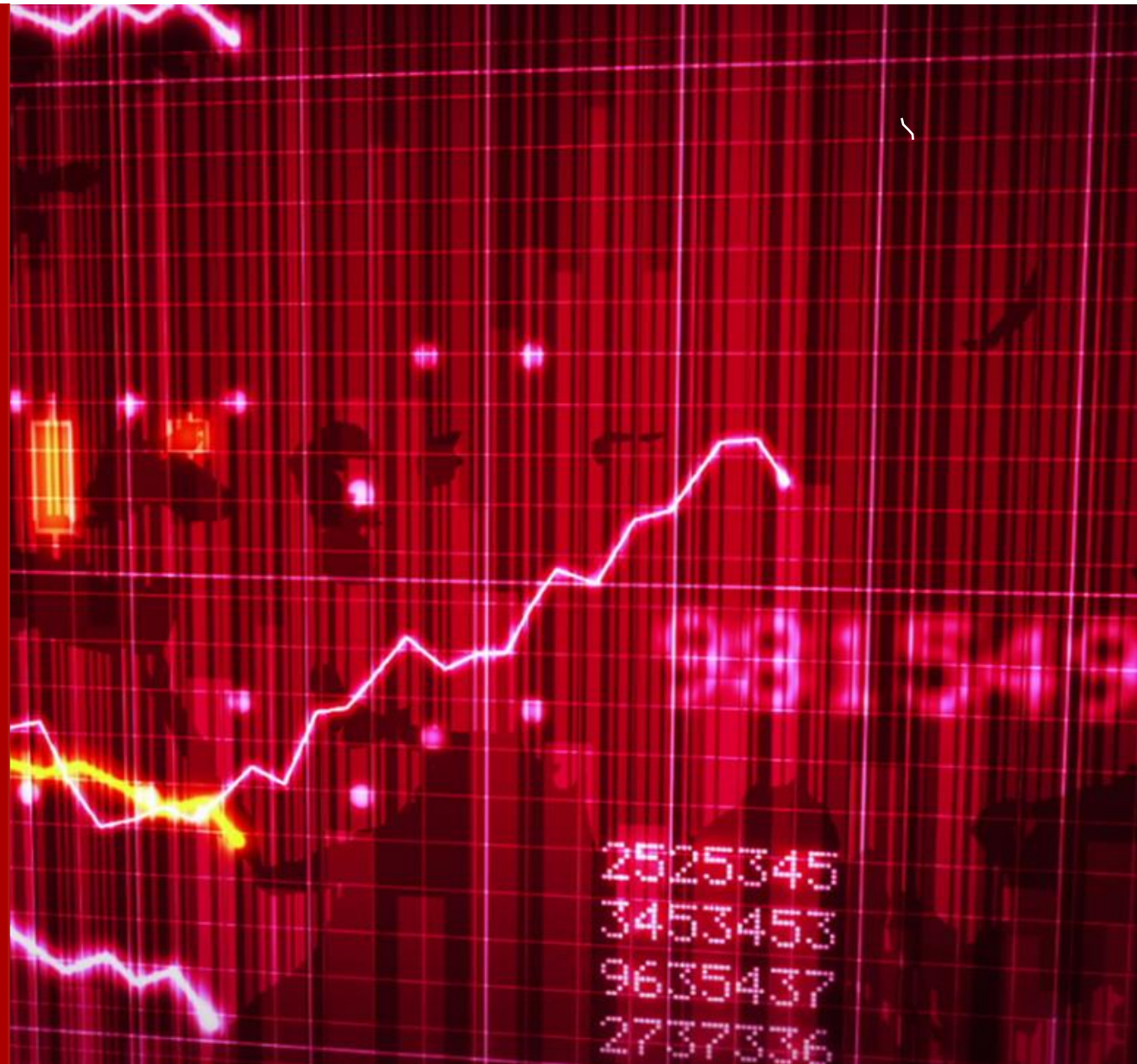
DataDirect Networks Japan
Hideaki Fukui

DDN | A Global Company For All Your Data Storage & 20 years

1998 DDN US Start

2008 DDN Japan Start

2018 DDN 20th anniversary of the founding
DDN Japan 10th anniversary

World's Largest Private Global Storage Company

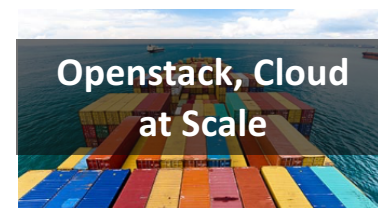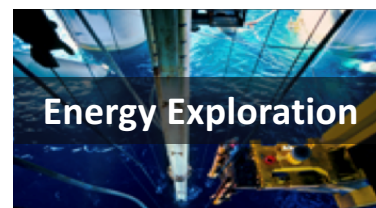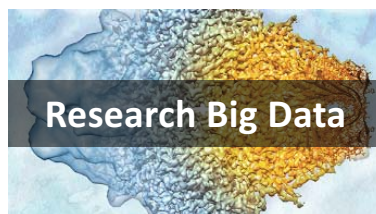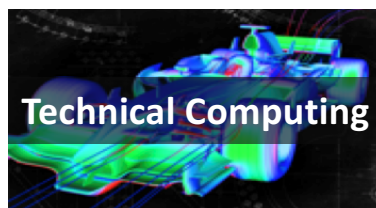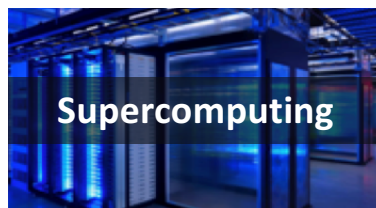**Delivering Exabytes of Valuable Data to Thousands of the World's Largest Organizations**

Solving Complex On-Prem and Cloud Data-At-Scale Challenges

DDN's Global Field, Support and Engineering Teams Cater to Your Data Challenges and at Any Scale

DDN | Scalable Storage Solutions for Your Specific Applications

- ► **Performance** Storage Platforms designed for scale

- ► All Aspects of **Scale**: IOPs, Throughput, Latency, Capacity, Distribution

- ► **Flexible** Architecture Design

- ► Global Services and Support from **Storage Specialists**

Supercomputing

Enterprise Analytics & Big Data

M&E Content Solutions

Technical Computing

Energy Exploration

Openstack, Cloud at Scale

Research Big Data

AI & Machine Learning

Govt. and Digital Security

World-Renowned & Award Winning

DDN®

IDC Analyze the Future

Inc.

Gartner

the (451) group

HPCwire

STORAGE

Federal Computer Week

DDN | DDN Product Offering

Storage Software
- WOS
- IME
- EXAScaler SW

SDS Appliances
- WOS
- IME
- EXAScaler ZFS

SFA Platforms
- SFA Block
- SFA Virtualization
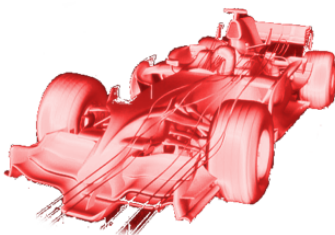- ES Appliances
- GS Appliances

Other Platforms
- JBODs
- Monitoring
- Special Development Projects

DDN | Maximize the Value of Data at Scale

Top Performance

We have delivered in production the fastest and most efficient NVMe and data storage platforms – over 1TB/s and 50M IOPs.

True Flexibility

NoSQL database? Fraud Detection? Analytics at scale? DDN has successfully met the needs of our customers' most challenging workflows.

Machine Learning | Big Data | Analytics | Research Computing

Seamless Scale

DDN's solutions provide linear scaling from midrange on premise needs to your largest scale globally distributed file system and object requirements.
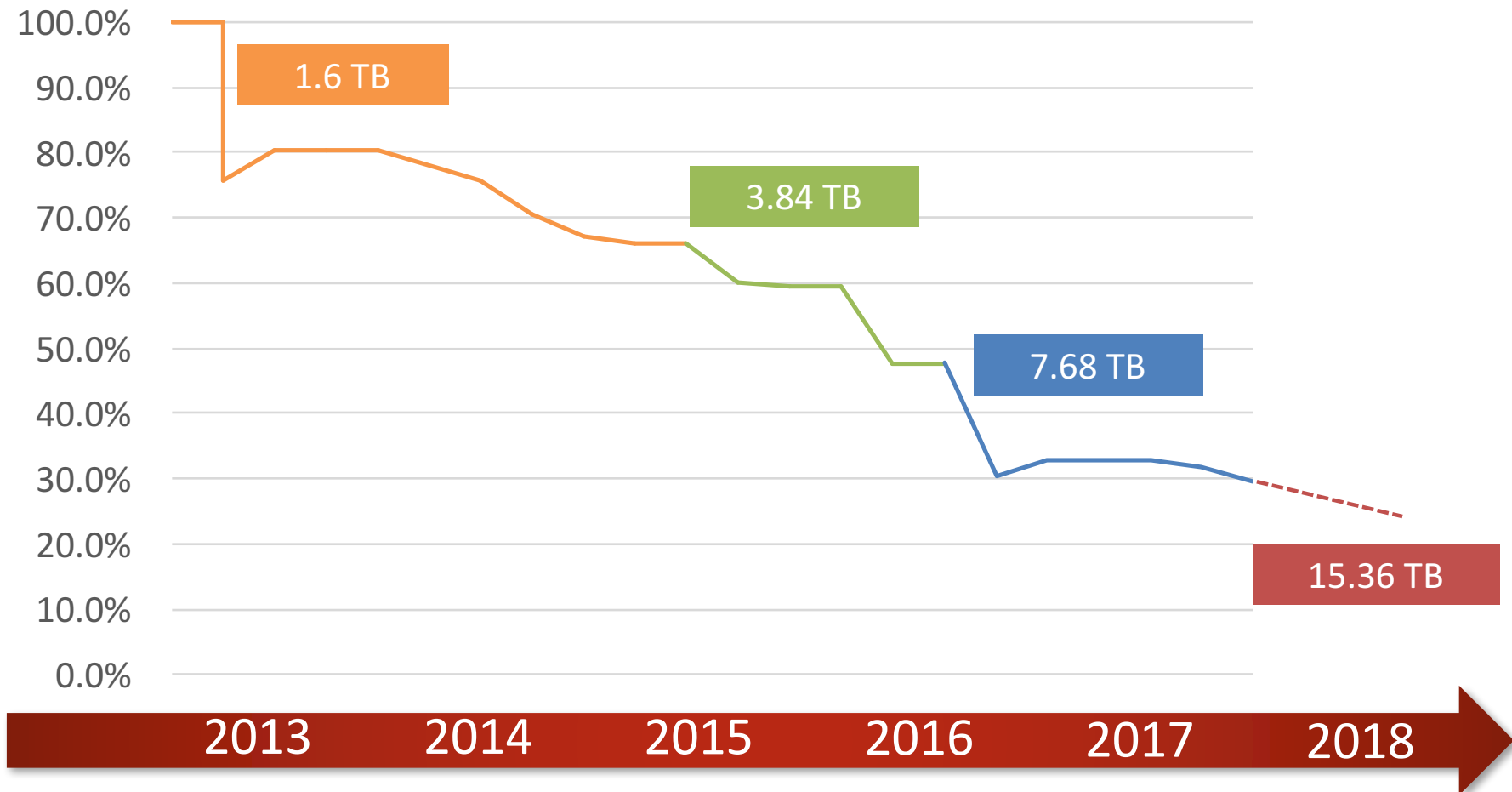
Intersect360 RESEARCH | STORAGE UNICORN JUNE 2017 | STRATUS 2017 AWARD | datanami 2017 AWARDS

Customer Satisfaction

DDN's worldwide team of technical experts has only one mission – delighting all our customers in all the markets we serve.

Met Office | PayPal | FMI Friedrich Miescher Institute for Biomedical Research | SUZUKI

Product Update

Flash cost performance "Down" per GB [2013 - 2018]

DDN | Full Refresh of the DDN Product Line in 2018

Flash & NVMe Platforms
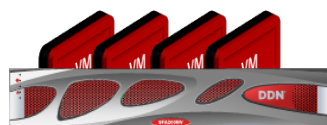
Hybrid Data Platforms, Integrated File System Appliances

▶ **Flash Solution SFA200NV**

▶ **Midrange SFA7990**

▶ **High Density JBOD SS9012**

▶ Twice as Fast, Same Cost

▶ New Flash Platforms

▶ Many Additional Features

▶ Margin Accretive

SFA200NV

SFA7990

SS9012

SFA200NVE

SFA7990E

SFA
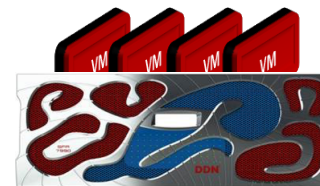
FLEXIBLE ALL NVMe FLASH

20GB/s

Parallel, Flexible Flash Performance

DDN SFA200NV

24x NVMe
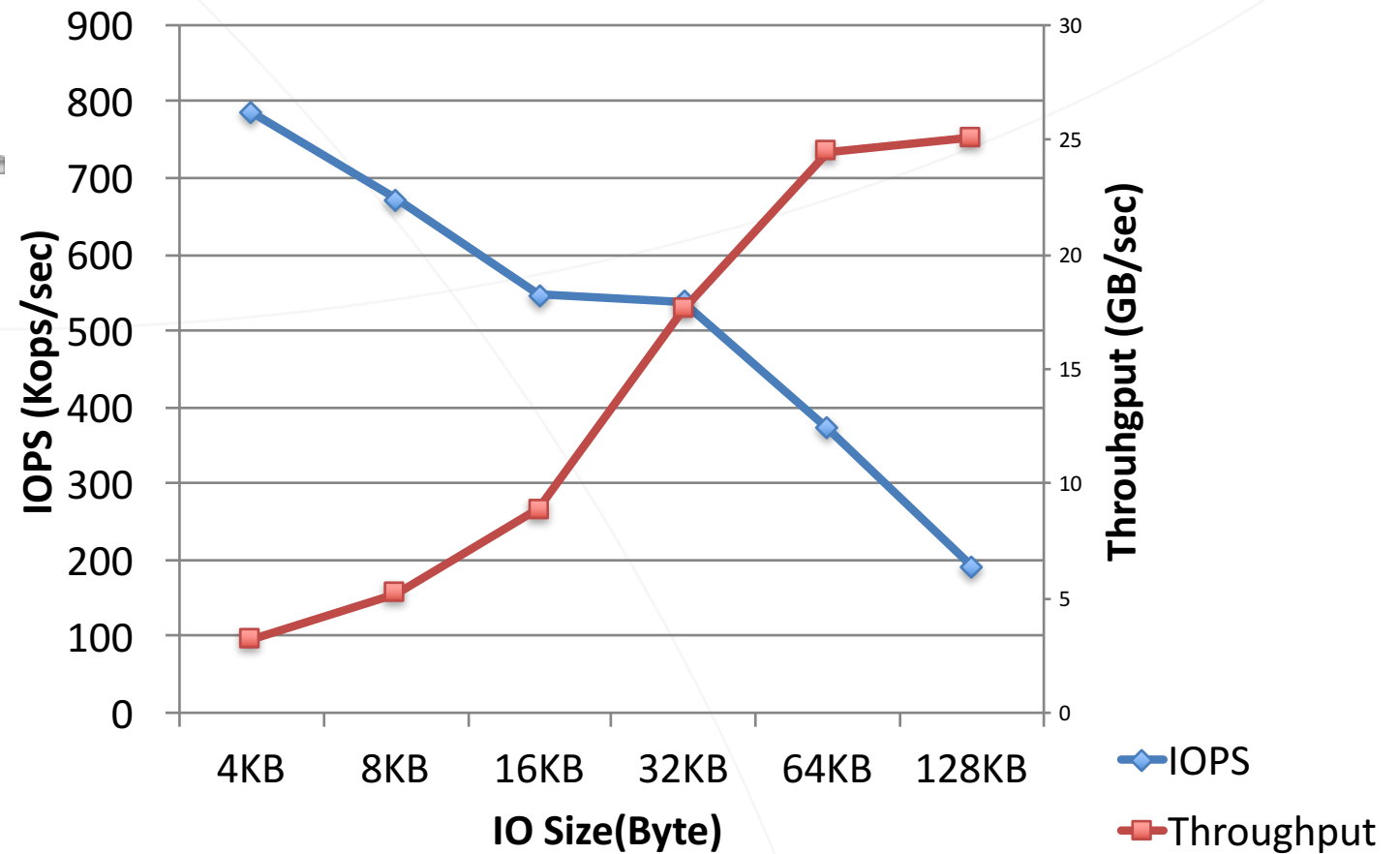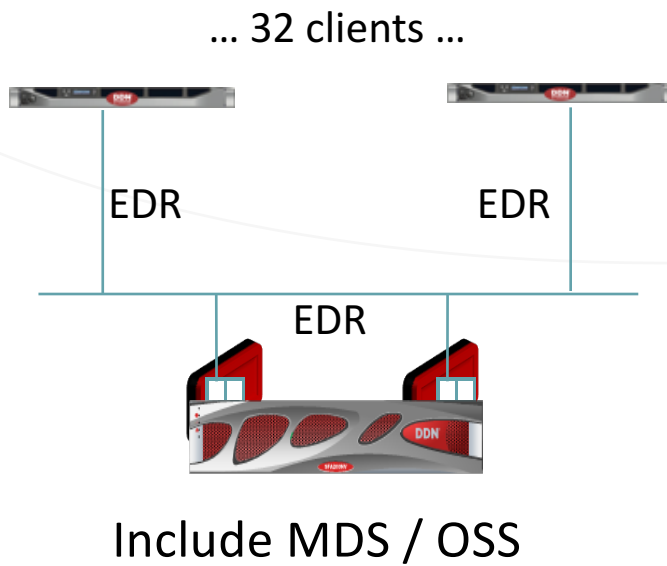**800GB- 1.6/3.2/6.4 TB**
960GB- 1.92/3.84/7.68/15.36 TB

I/F
4x IB EDR VPI
2x OPA (Embedded Parallel Fileserver)
8x 8GbpsFC
8x 16/32GbpsFC

AI200 (RANDOM READ IOPS AND THROUGHPUT)

... 32 clients ...

EDR   EDR

EDR

Include MDS / OSS

©2018 DataDirect Networks, Inc.

FAST & SCALABLE
HYBRID STORAGE
INTEGRATED FILESYSTEMS

20GB/s

Parallel File System
Performance & Capacity with
Hybrid Flash + Disk Drives

DDN SFA7990

4U 90x SSD / NL-SAS HDD
800GB- 1.6/3.2/6.4 TB
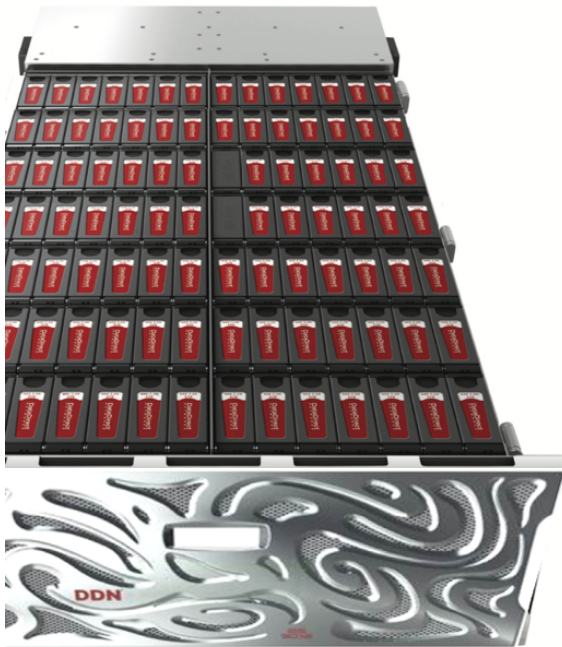**960GB- 1.92/3.84/7.68 TB**
4.0 / 6.0 / 8.0 /10.0 /12.0 /14.0 TB

I/F
4x IB EDR VPI
2x OPA (Embedded Parallel Fileserver)
**8x 16GbpsFC**

DDN SS9012

▶ **SS9012 will be the DDN standard drive enclosure**

▶ **Supported on SFA14KX, and SFA7990 series products**

SS9012	
RU	4
Disk Slots	90
PSUs	4 PSUs (2+2 redundant)
Cooling	5 independent fans
IO Modules	x2 IO modules, Fully 12Gb/s SAS x4 4-Lane Ports per IO Module
Baseboard	12Gbps throughout
Cabling	Copper or optical SAS

SFA7990 Performance Data
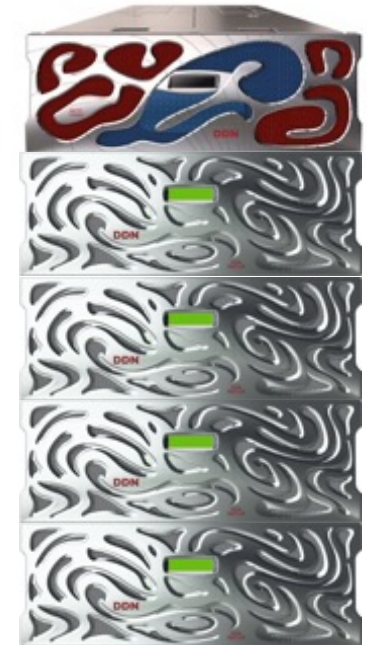
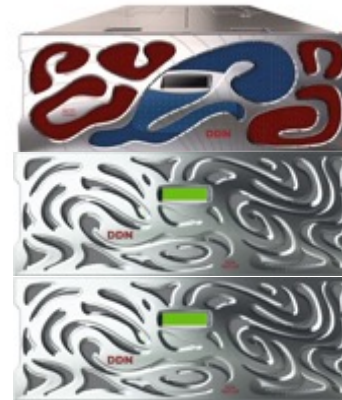## IOR Sequential Throughput of AI7990
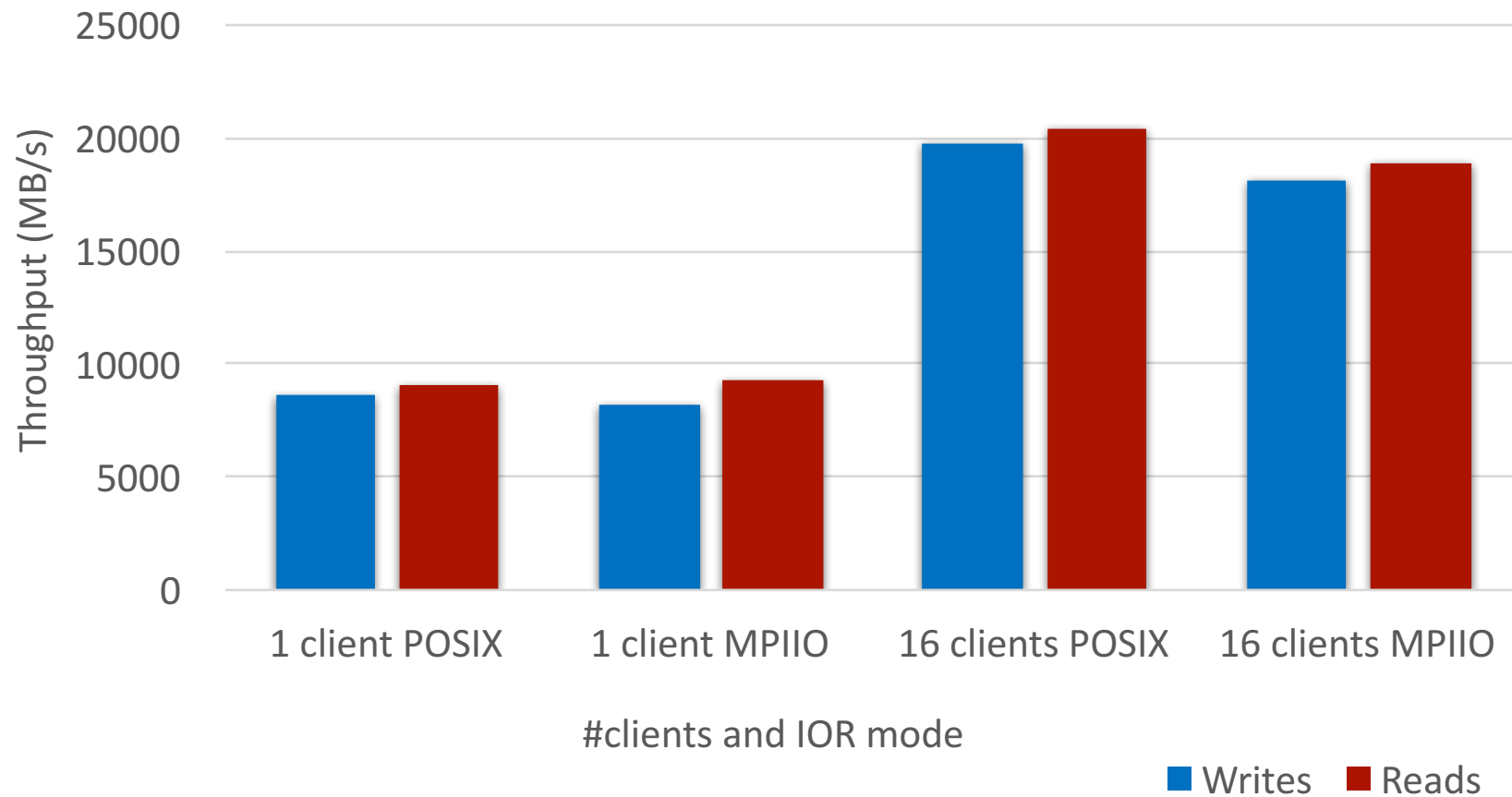
SFA7990 at Scale by SS9012 / 14TB HDD

- **Start at 4U and Scale-out or Scale-Up**

Shared data access through a unified, scalable namespace. Add HDD or SSD to a single SFA7990

- **Flexible Implementation and Performance**

An all-round performer across Throughput and IOPs, File and Block, SSD and HDD

180'HDD
18-20 GB/s
2.0 PB

270'HDD
20+ GB/s
3.0 PB

450'HDD
20+ GB/s
5.0 PB

DDN | Into the enterprise AI mainstream by A3I solutions

► The AI200 has up to 360TB of 24 x dual-ported NVMe flash drive capacity inside its 2U enclosure, and hooks up to the DGX-1 with either 4 x EDR InfiniBand (EDR IB) or 100Gbit/s Ethernet (100 GbitE). It delivers up to 20GB/sec of file system sequential read throughput and over 1 million IOPS.

► The larger AI7990, in a 4U cabinet, reverts back to 20Gb/sec sequential read performance and provides up to 700,000 IOPS. It supports 90 x 3.5-inch slots for SSDs and disk drives. There can be up to 4 expansion chassis, each with 90 bays, providing up to 5.0PB of usable capacity.

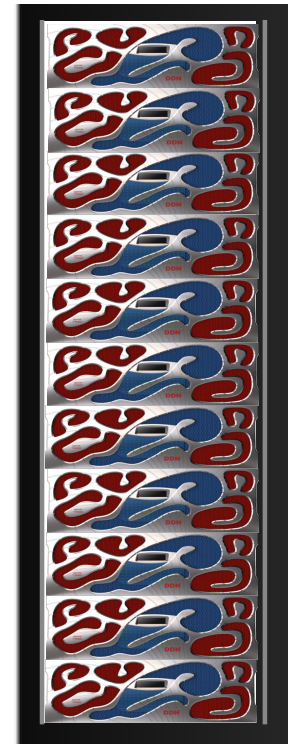DDN A³I WITH DGX-1 LAUNCH PARTNERS

SFAOS Update

SFA OS11.x New feature

- **Declustered RAID**
- **NVMe Support**
- **Multiple VD per pool / Dual port Drive access**
- **Strip Groupe Count (DCR IO perf)**

Embedded platform:
- **HCA PF Pass-thru**
- **VirtIO-SCSI driver**

Declustered RAID
SFAOS FAST, DECLUSTERED OPERATION

HIGHER AVAILABILITY

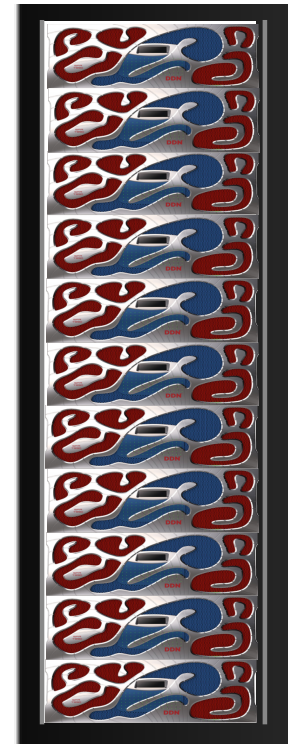Faster Rebuilds, and more options for sparing and spare capacity management

MAINTAINS FLEXIBILITY

Highly Flexible Pool Management allows simple creation of VDs across any-size HDD/SSD Pools
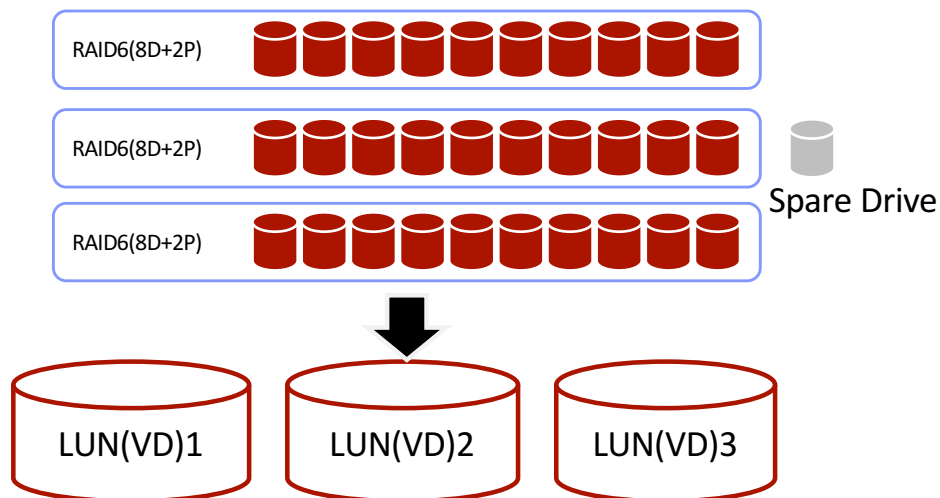
PERFORMANCE OPTIMIZED

IOPs optimized to deliver the most IOPs to the platform – Block IOPs AND File IOPs

Legacy RAID vs DCR

Legacy RAID - 31Drive
3x RAID6(8D+2P) +1 Spare Drive

RAID6(8D+2P)

RAID6(8D+2P)

RAID6(8D+2P)

Spare Drive

LUN(VD)1   LUN(VD)2   LUN(VD)3

DCR POOL - 31Drive

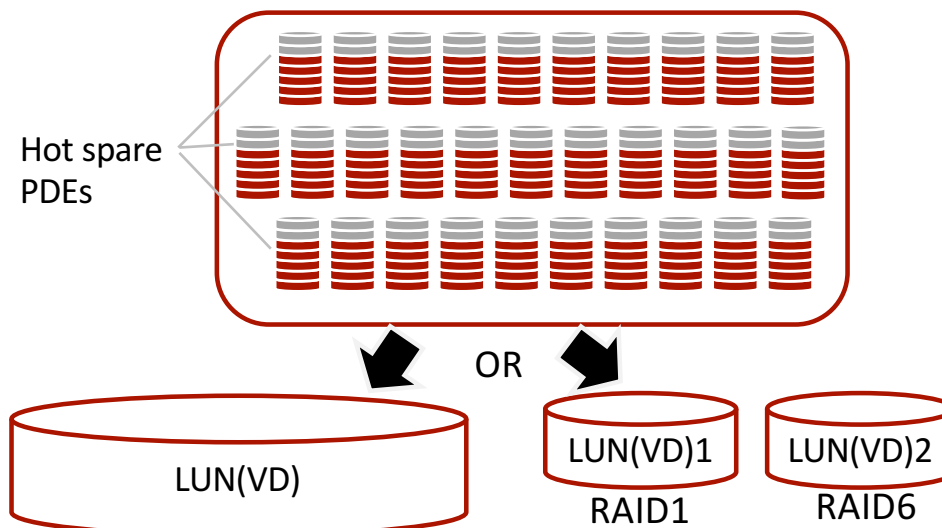Hot spare PDEs

OR

LUN(VD)

LUN(VD)1
RAID1

LUN(VD)2
RAID6

Example with 3 RAID 6 (8+2) pools
Rotating 8+2 parity across the Pool (or more correctly, across the VD, but here we have 1:1 VD:Pool)
RAID Pools has a RAID stripe size which is defined by the chunk size – write one 8 chunks of data and 2 chunks of parity for each stripe separate hot spares are optionally available in the event of a drive failure
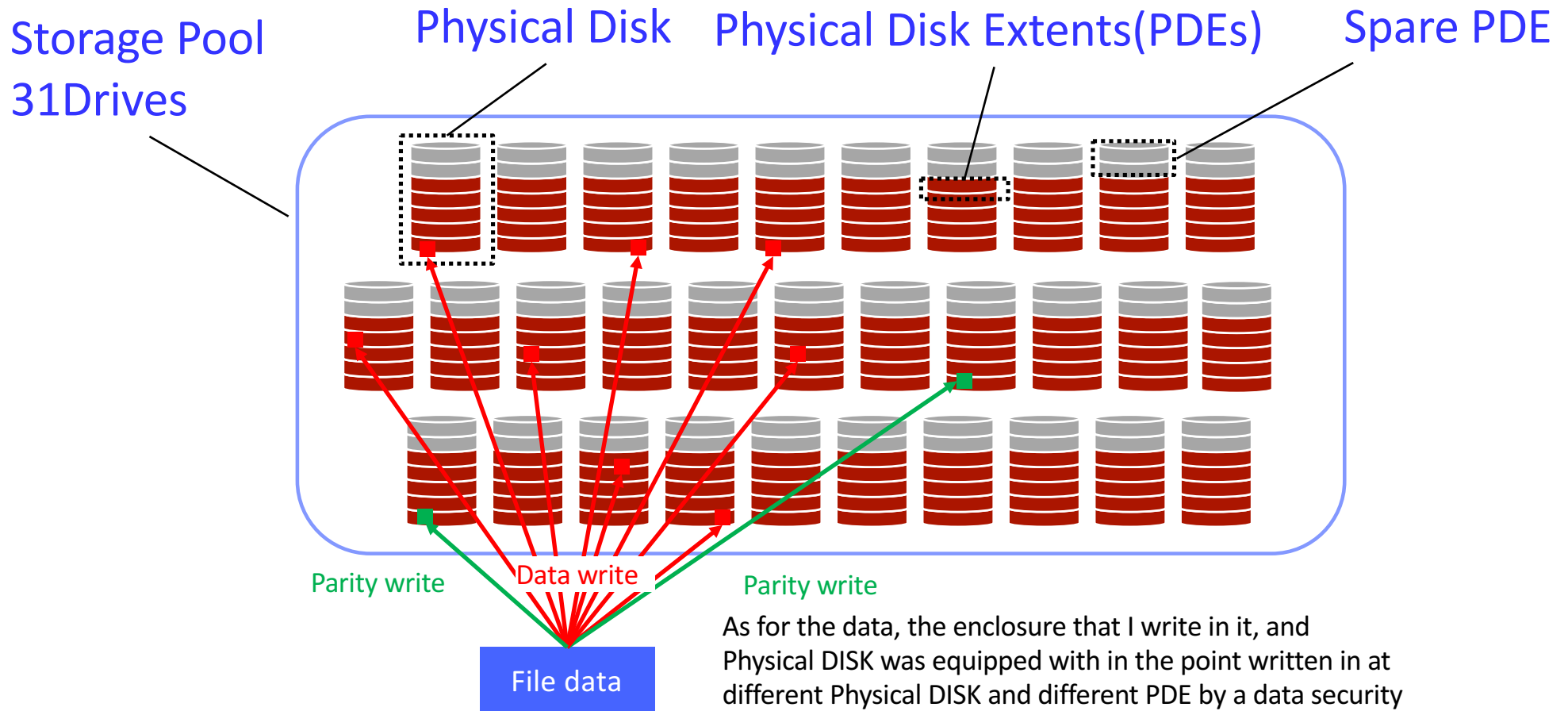
Example with the same number of drives (31)
Now we create a single DCR Pool across all 31 drives
The DCR creation divides all PDs into 8GiB PDEs
The formattable capacity appears lower than traditional RAID as we include hot spare PDEs within the pool (at least large enough to cope with a single drive failure)
e.g. for 31x 8TiB drive we utilise 8TiB for spare PDEs

De-clustered RAID (DCR) Data & Parity Write

**Storage Pool
31Drives**

Physical Disk

Physical Disk Extents(PDEs)

Spare PDE

Parity write

Data write

Parity write

File data

As for the data, the enclosure that I write in it, and Physical DISK was equipped with in the point written in at different Physical DISK and different PDE by a data security method of 8D+2P is considered

Rebuild technology

Legacy RAID - 31Drive
## 3x RAID6(8D+2P) +1 Spare Drive

DCR POOL - 31Drive
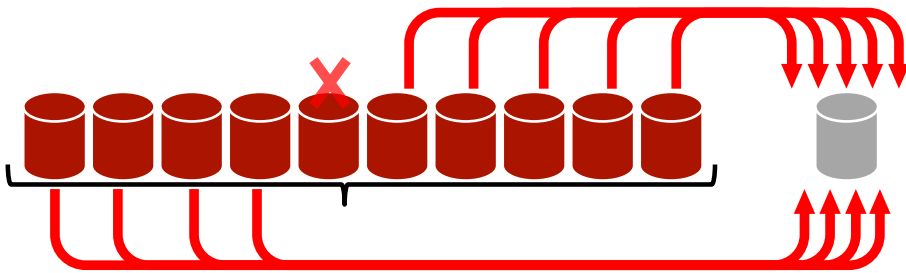
- Because one drive takes charge of all write processing when rebuild does data using a hot spare drive, it becomes the bottleneck of the rebuild processing performance. Therefore, Rebuild becomes it for a long time, and the risk of the Taro strike increases on the day by the simultaneous obstacle of plural drives. In addition, a performance decreases with becoming it for a long time for long time of rebuild.
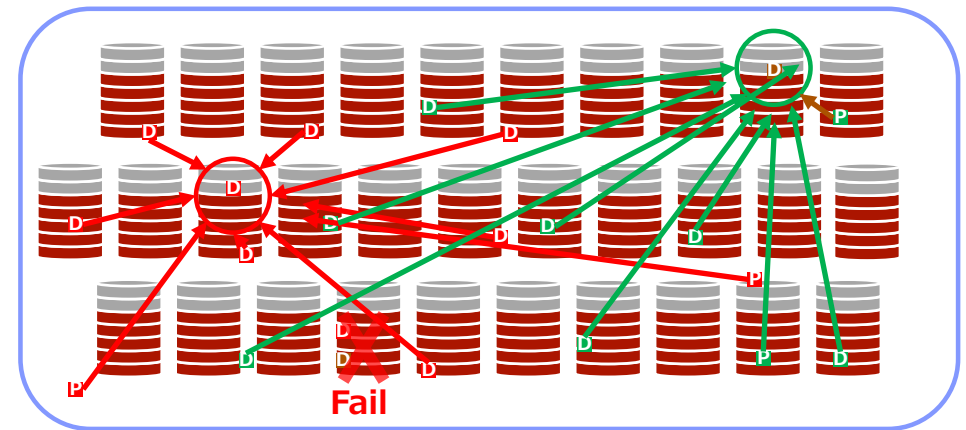
- Many other drives contribute to PDE rebuild
- other PDEs that resided on the failed drive are rebuilt (such that the rebuilding PDEs are spread across multiple drives)

DCR rebuild performance (use 4TB NL-SAS)
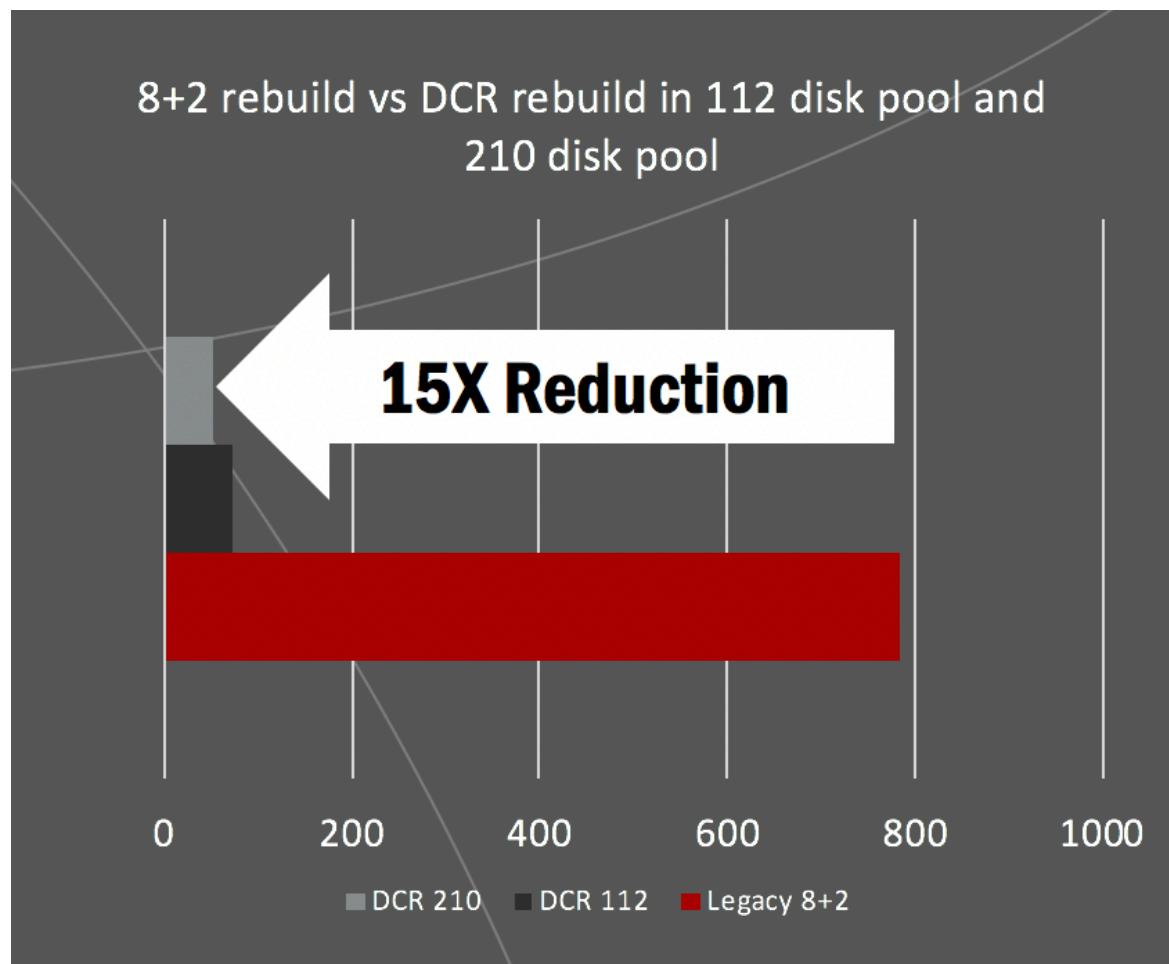
Thank You!

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