



Works with Nx
Webinar





About Ambedded Technology

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Ambedded is the professional, enterprise, software defined storage manufacturer and solution provider since 2013.

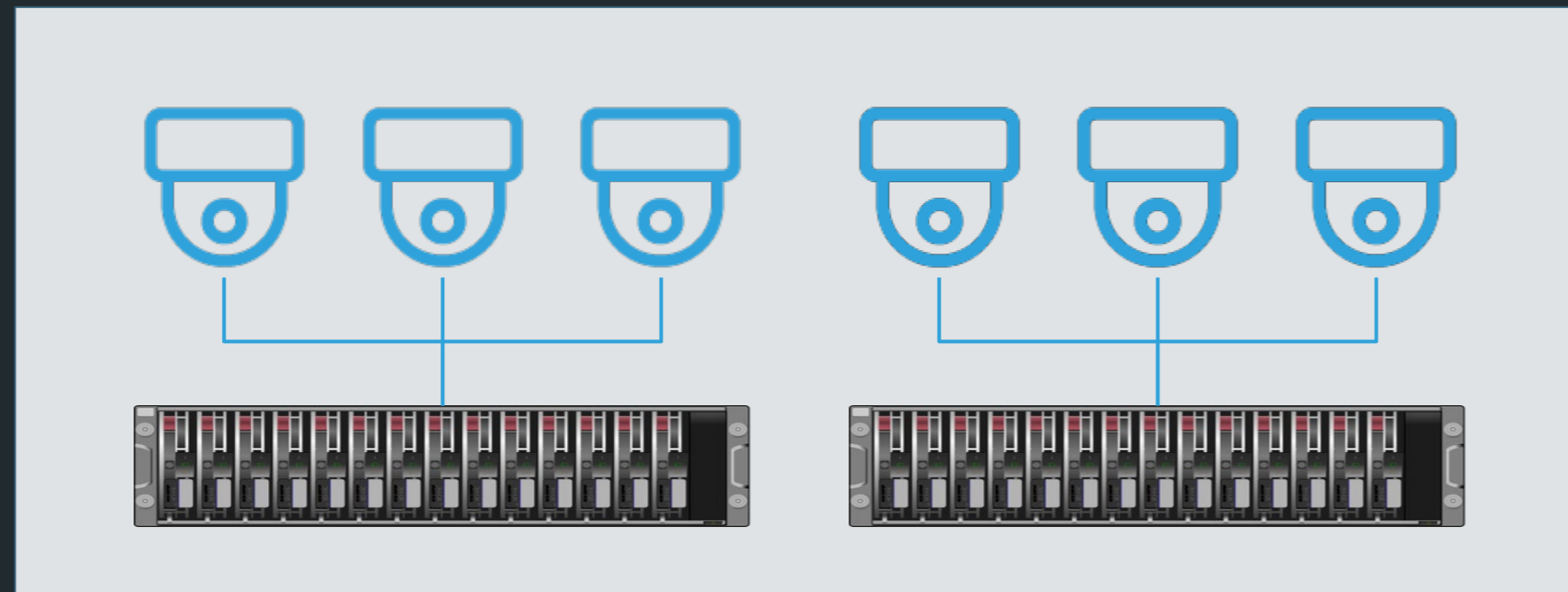
We design Arm micro server platform for our storage appliance and now for Powered by Nx software products (like Nx Witness VMS).

Mars 400Nx

Arm Microserver Based Scalable
Software Defined Storage
Supports Nx Server

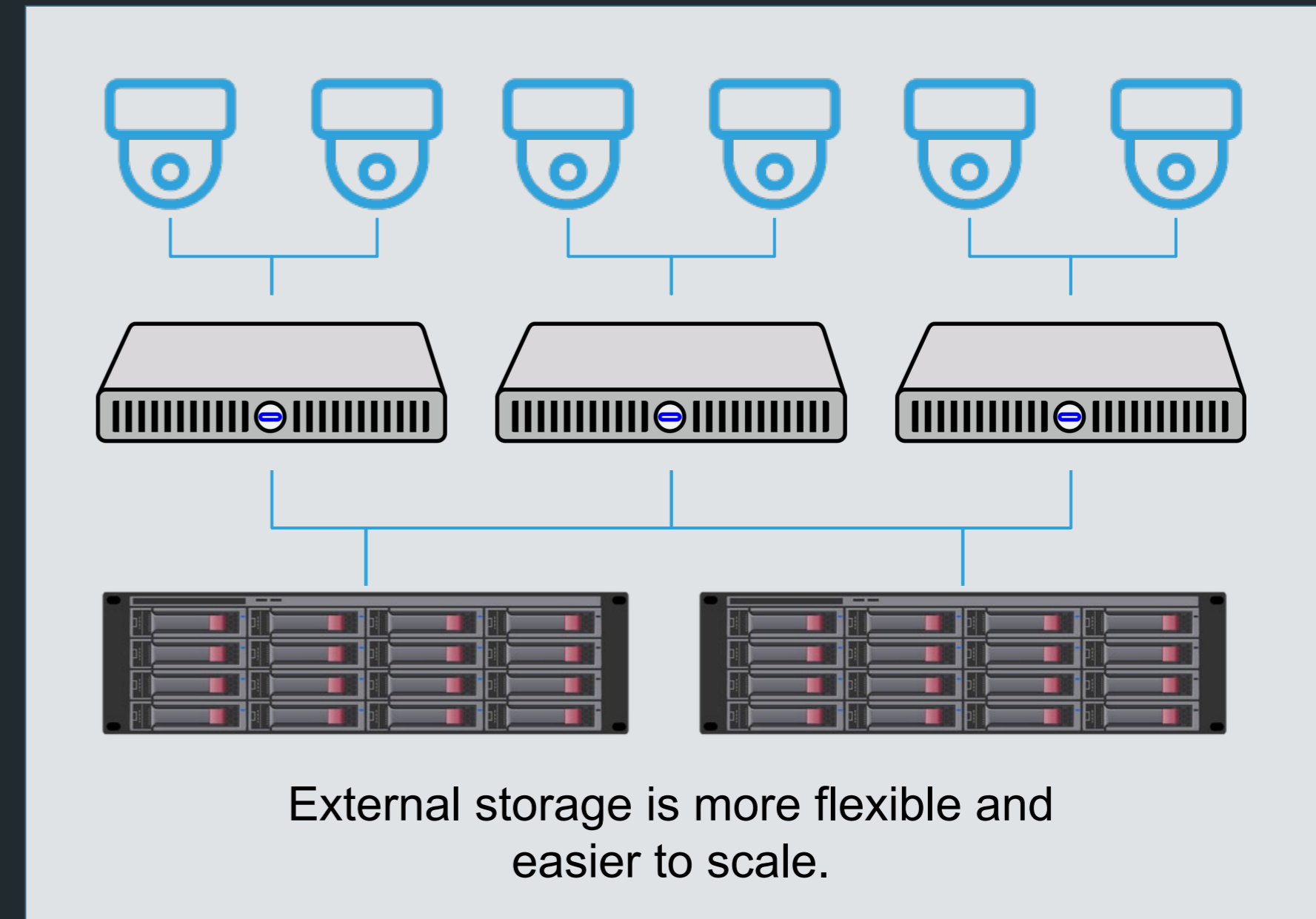
Solution 1 - Traditional

Nx Servers capture and write to direct attached storage



Solution 2 - Ambedded Approach

Nx Servers capture and write to external network storage





Limitations with Current Approach to Storage

- **RAID technology does not fit today's high capacity demands**
 - RAID 5 & 6 have high possibility to fail when re-build the high capacity hard drives
 - Bigger drives = longer rebuilds -> more latent errors -> great chance of failure
 - Disk rebuilds impact the video recording
 - **RAID protects data against disk failure but can't protect data against server failure.**
 - Prohibit you from using large capacity hard drives for cost reduction
- **Traditional server has a big failure domain.**
 - All data will lost if single server fails .

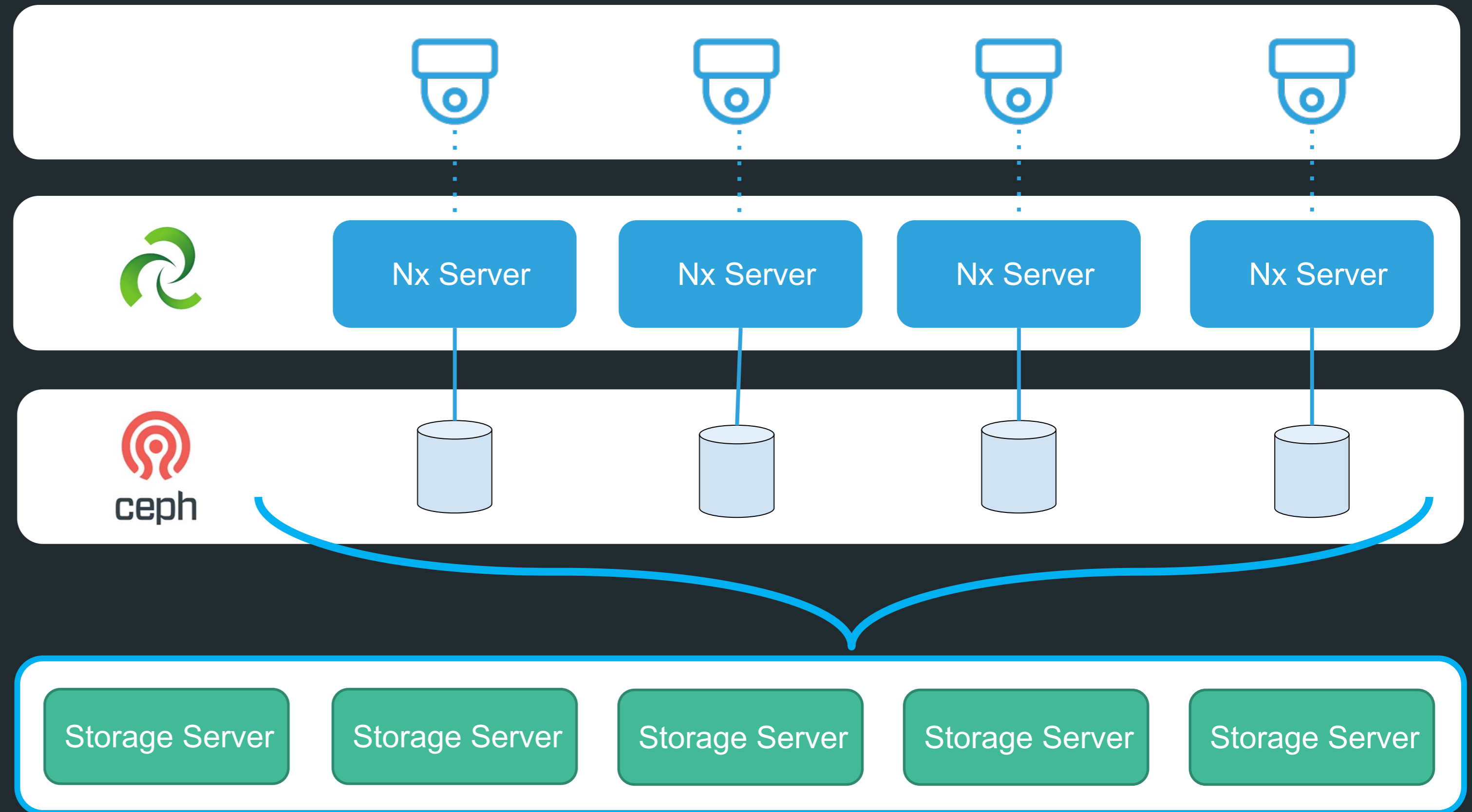
Embedded
Converged
Solution

IP Cameras
(e.g. 1080p, 30fps)

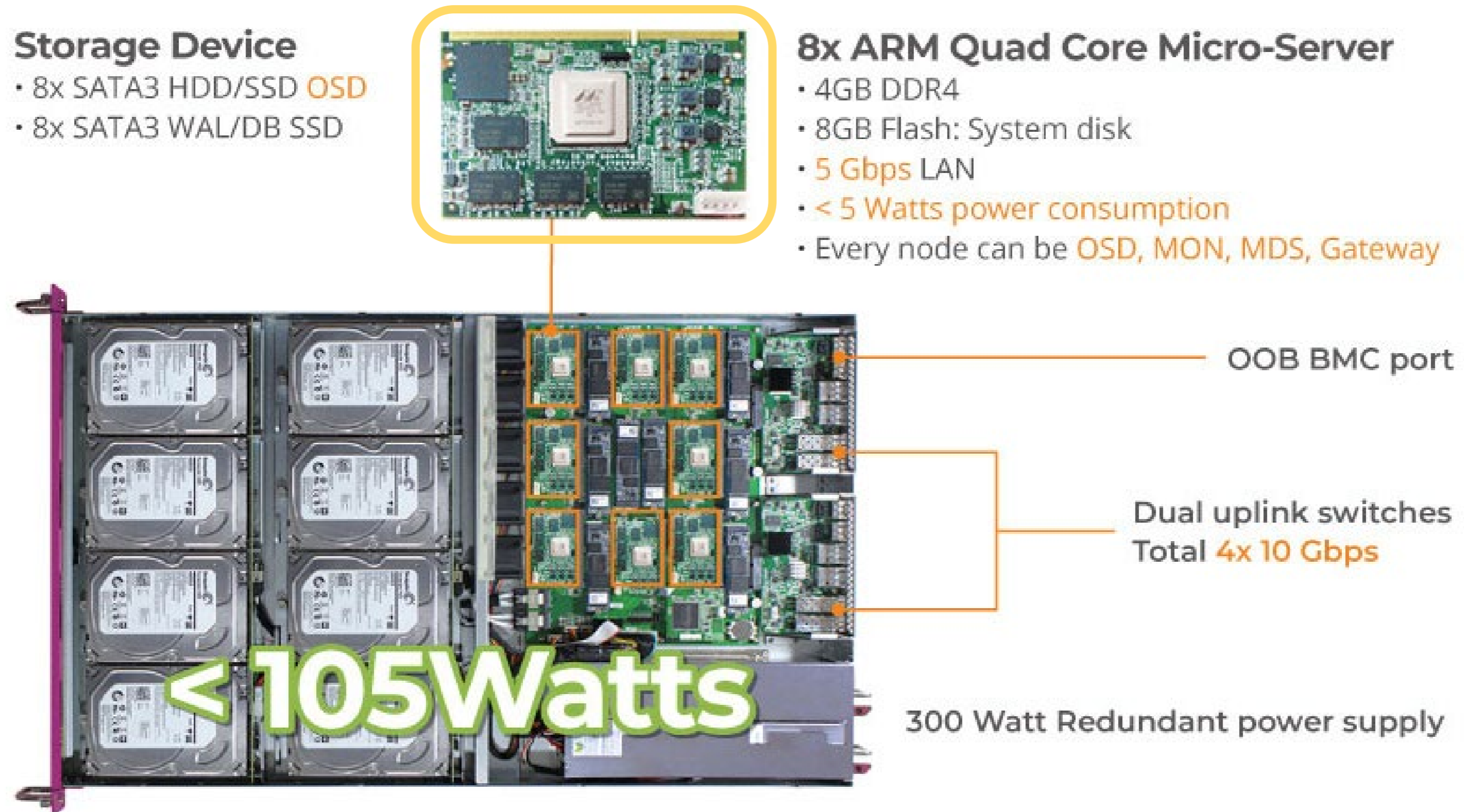
Powered by Nx Software
Install Nx Servers software
on Mars 400Nx

Virtual Disks
Provided by Ceph Storage (SDS)

Ceph Storage Cluster
Running on Mars 400Nx



Embedded
Converged
Solutions



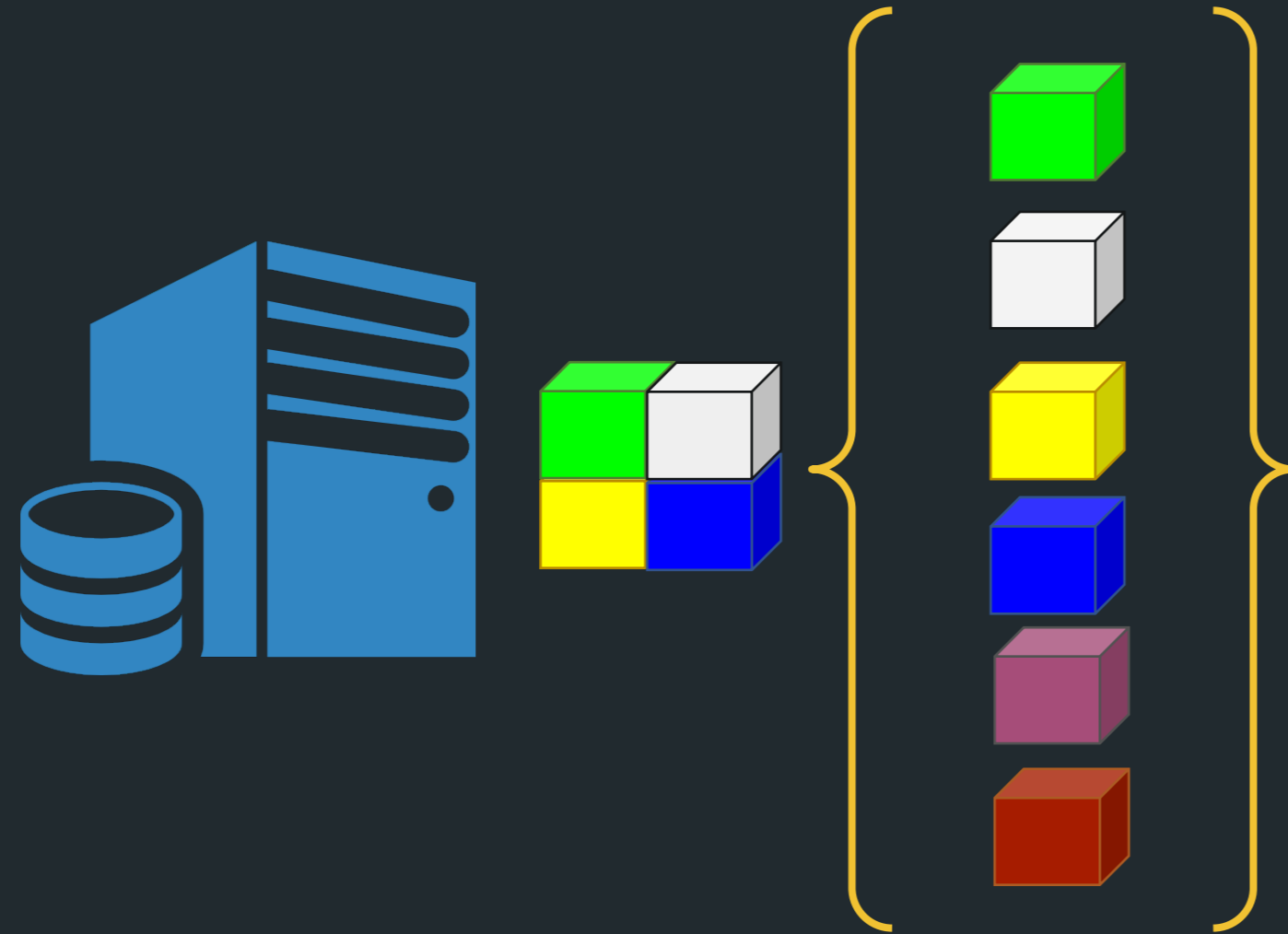
Every microserver can be defined as:

- An Independent Linux Server
- An Nx Server
- A Storage Node

Software Defined
Storage Clusters
Powered by
Microservers

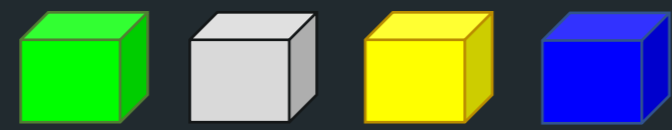
Ambedded Converged Solutions

- **Software algorithm controlled distributed storage.**
There is no RAID controller.
- **No single point of failure**
Protect data against multiple disk, server, chassis and rack failures. (software defined)
- **Flexible data protection**
Use software erasure code to provide
- **Small failure domain**
One microserver, one hard drive
- **Auto data re-heal**
All healthy drives and micro servers in parallel
- **Scalability**
Linear scalable on capacity and throughput



Defining Failure Domain and Erasure Coding

Data Chunks



K=4

Coding Chunks



M=2



$K+M = 4+2$, Allows max. 2 chassis failures
Capacity consumed is $(K+M)/K$ of original data

Client Server
Compute Object
Location

Placement Group $\rightarrow (K+M)$
OSD located in different failure domains

Ambedded Converged Solution

Nx Server
running on
Ambedded
arm microserver

- High Density IP Camera Server (1U)
 - Capture & Manage 30 x 1080p 30fps high resolution IP cameras
 - Recording, Streaming, and Viewing
- Failover made simple.
 - Add spare nodes as needed for automatic camera failover (enabled by Nx Server Hive Architecture)

Product Demo
Mars 400Nx
ARM-based Microserver



8 x ARM 1.6GHz dual core servers

Project Requirements

1. Number of cameras: 200 cameras
2. Bit Rate per camera for 1080p, high quality, 30 FPS: 4.87Mbps
3. Recording hours per day: 16 hours
4. Days to record: 60 days

System Design Exercise

Calculating Storage Requirements

1. The total usable storage capacity required: 411 TB
2. The total raw capacity required if we use erasure code 4+2: 678 TB
3. Hard drive capacity: 16 TB
4. Number of hard disks required: 43 HDDs

Ambedded Mars400Nx Design

Calculating required microserver node numbers:

- Ceph MON node = **3**
- Ceph OSD node (with HDD disk) = **43**
- Nx Server nodes = $200/30 = 7$
- Spare node for Nx server failover = **1**



System Design Exercise

Total Microservers number = $3+43+7+1 = 54$ nodes

Total Mars 400Nx QTY = $54/8 = 7$ sets of Mars 400Nx

Power Consumption: 7×100 Watts = **700 Watts (excluding hard disks)**

Using 2U 12bay x86 servers

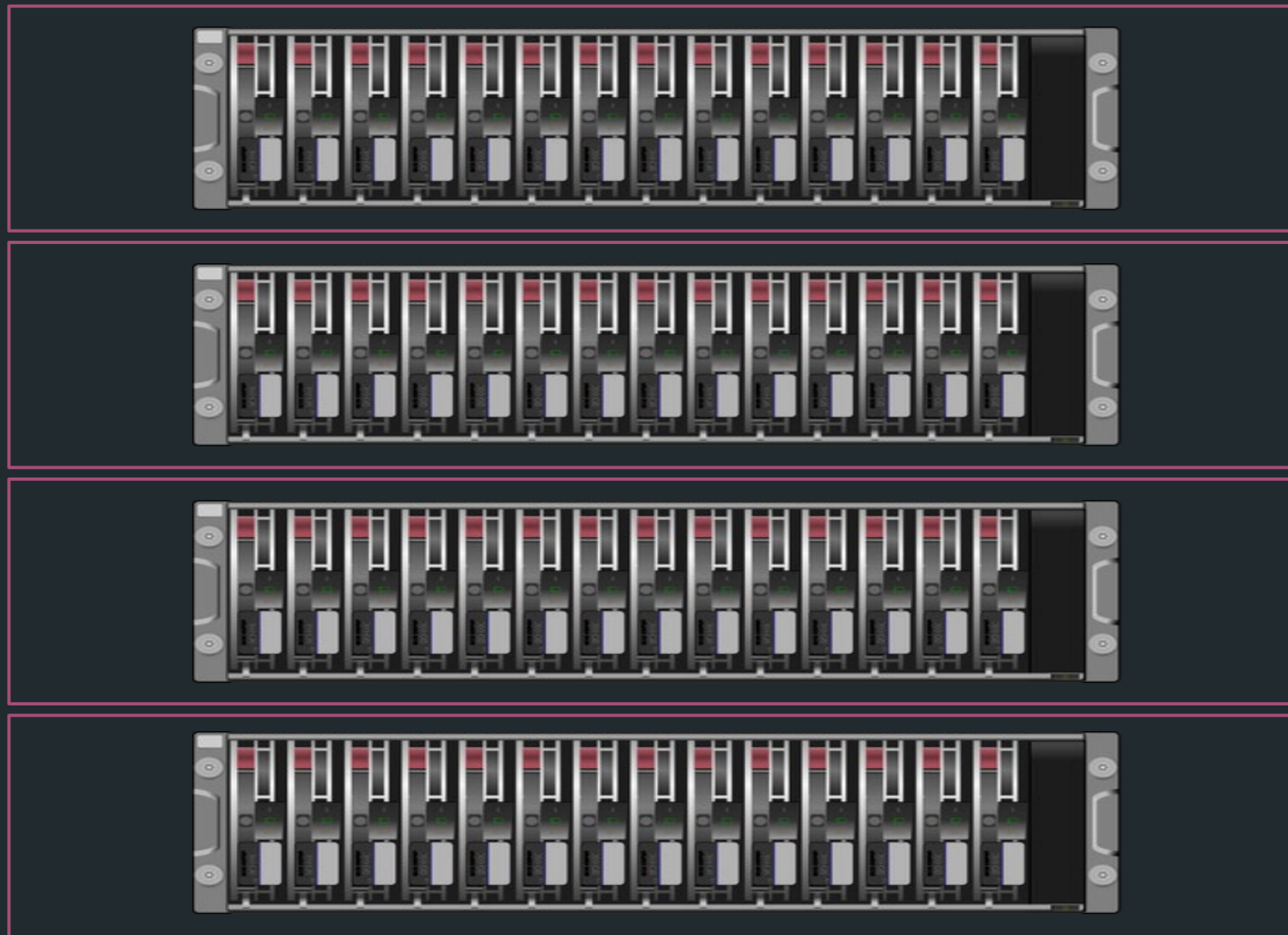
- 4 servers to support 43 HDDs
***** ATTENTION : 16TB HDD for RAID is RISKY**
- Each server supports 50 cameras
- Total 4 x 2U server
- Power consumption > 1600 Watts



System Design

Traditional Servers

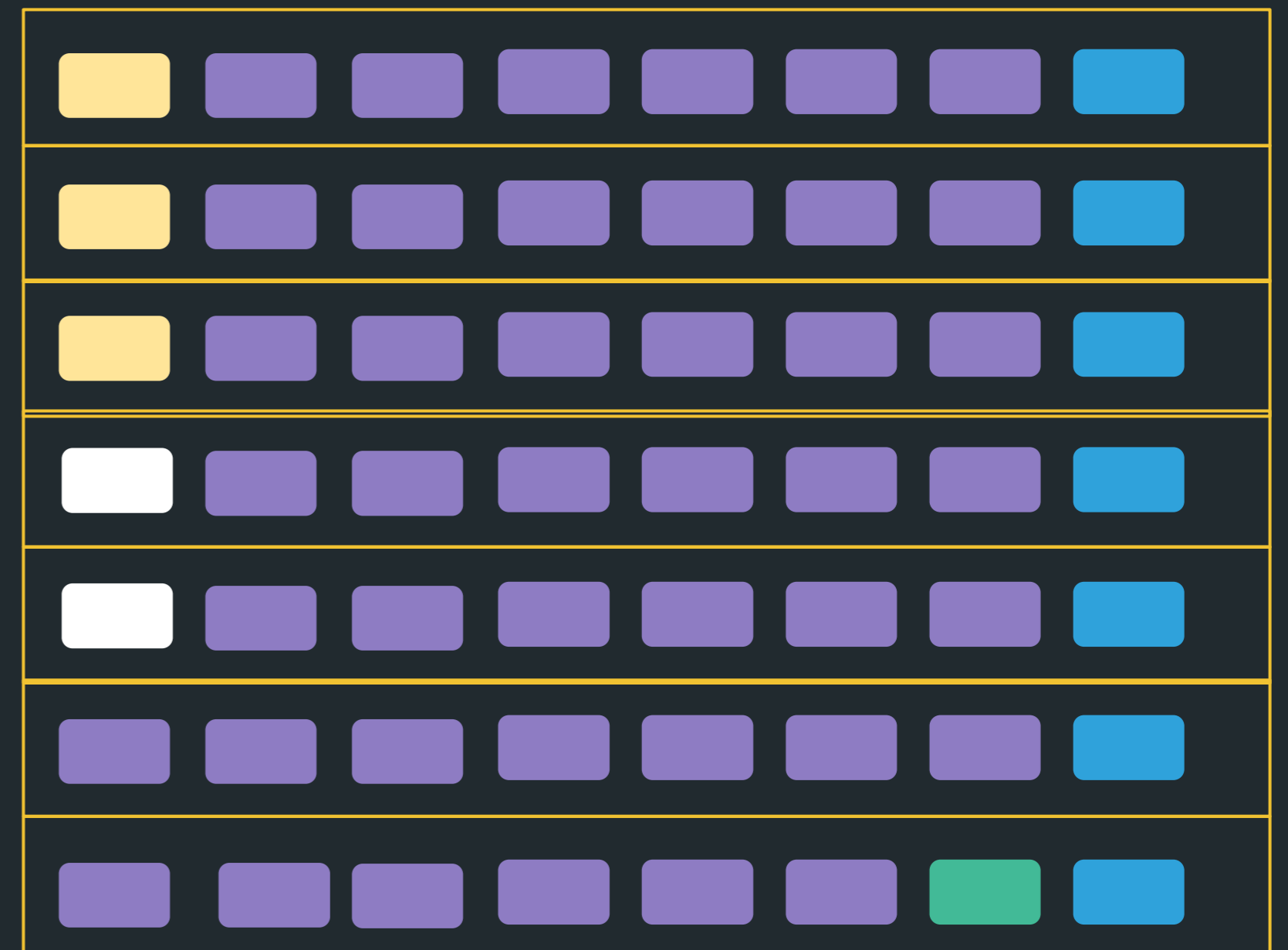
Servers: 4 x 2U Rackmount Server
 Rack Space : 4 x 2U = 8U
 Power Consumption: > 1600 Watts (HDD excluded)



4 x 2U Rackmount Servers
 43 x 16TB HDDs spread over 4 chassis

Embedded Approach

Servers: 7 x 1U Mars 400Nx
 Rack Space: 7 x 1U = 7U
 Power Consumption: < 700 Watts (HDD excluded)



2 x spare microserver for future use 3 x MON for storage 43x HDD as OSD for storage 7 x Nx server node + 1 for spare

Total Solution

Nx Server and high available software-defined storage

Easy to Deploy

Pre-installed and pre-configured Nx software

No Single Point of Failure

Smaller failure domain

Saves Power

65% less power cost

Saves Space

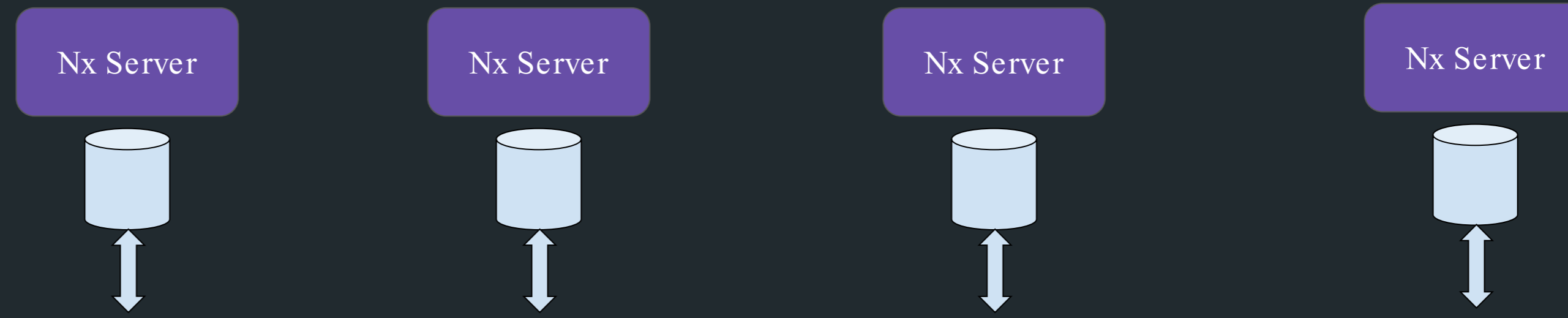
7U (Ambedded), 8U++ (Traditional)

The Benefits of
integrating
[Mars 400Nx](#)
with Nx.



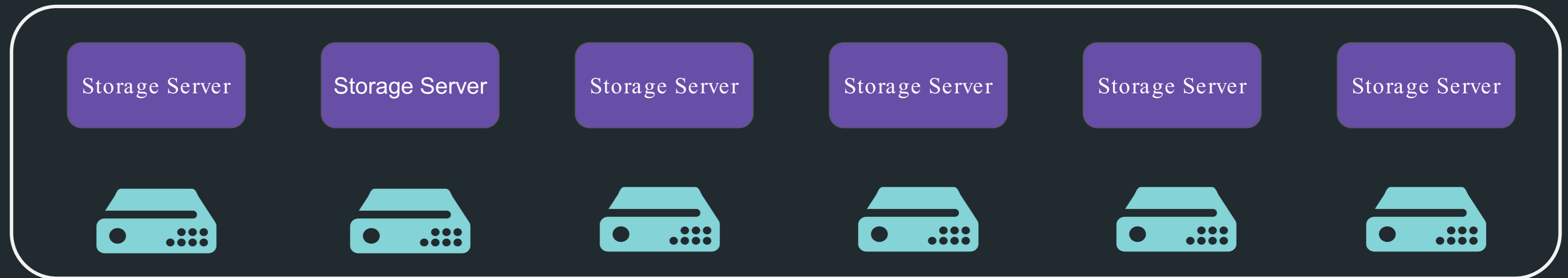
Micro server can be configured either as Nx Server or Storage Server

Nx Server mount a virtual disk from storage pool. It can be re-size if it needs a larger capacity.



If Nx Server fails, virtual disk won't be hurt. Virtual disk can be mount to the other healthy Nx Server for read/write or wait for the failed back to normal

How Mars 400Nx Works with Nx



Storage cluster works as a storage pool to store data.

Data are protected by replication or erasure code in Storage cluster

When disk/server fails, Storage cluster auto rehaul data to healthy nodes

Storage cluster provision block devices to Nx Server for storage

Product Demo
Mars 400Nx

admin
Current Statistics Forecast for Full Storage Usage Refresh

- Servers
 - Server mars-4003-0471a7c
 - Server mars-4004-3ea9371
 - Server mars-4005-2ca9ffe
 - Server mars-4006-82de7f9
 - Server mars-4007-a2e346d
- Layouts
- Web Pages
- Users
- Other Systems
- Local Files

Camera	Space	Calendar Days	Current Bitrate
TestCameraLive	11.75 GB	4 hours	4.00 Mbps
TestCameraLive	11.75 GB	4 hours	3.76 Mbps
TestCameraLive	11.72 GB	4 hours	3.22 Mbps
TestCameraLive	11.77 GB	4 hours	3.53 Mbps
TestCameraLive	11.78 GB	4 hours	3.63 Mbps
TestCameraLive	11.80 GB	4 hours	3.76 Mbps
TestCameraLive	11.72 GB	4 hours	3.43 Mbps
TestCameraLive	11.72 GB	4 hours	3.43 Mbps
TestCameraLive	11.72 GB	4 hours	4.00 Mbps
TestCameraLive	11.74 GB	4 hours	3.41 Mbps
TestCameraLive	11.77 GB	4 hours	3.71 Mbps
TestCameraLive	11.75 GB	4 hours	3.23 Mbps
TestCameraLive	11.72 GB	4 hours	3.51 Mbps
TestCameraLive	11.75 GB	4 hours	3.44 Mbps
TestCameraLive	11.75 GB	4 hours	3.15 Mbps
TestCameraLive	11.75 GB	4 hours	3.22 Mbps
Total - 30 cameras	352.51 GB		163.41 Mbps

Nx Server on Arm Microserver - 30x 1080p streams per node

Quick Self Recovery when HDD Fails.
No Interruption to VMS operation.

Product Demo
Mars 400Nx



WORKS
WITH 



Where to Buy
Mars 400Nx

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Q&A

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