

IMAGIN⁺ the Possibilities

Welcome to FMS 2023

Media Presentation

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Director of Technical Marketing



Flash Memory Summit

PHISON



Flash Memory Summit



AGENDA

Corporate Update

What is Imagin+?

Product Showcase

X2 – Enterprise Gen5

E26 “Max14um” 14GB/s

PS5027-E27T

E18 pSLC



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The Possibilities

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Corporate Update

Quick Facts About Phison



Experience

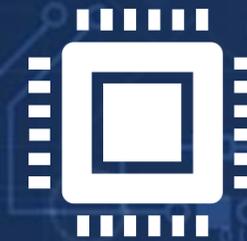
23+

Years



\$2B

2022 Revenue



600M

Annual Controller Shipments

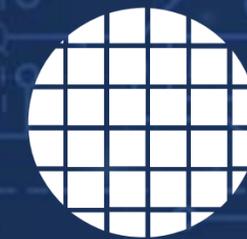


**3800
+HC**

75% R&D

Business Categories

Client | Embedded | Enterprise
Automotive | Gaming | Design Service
Power IC | Signal IC



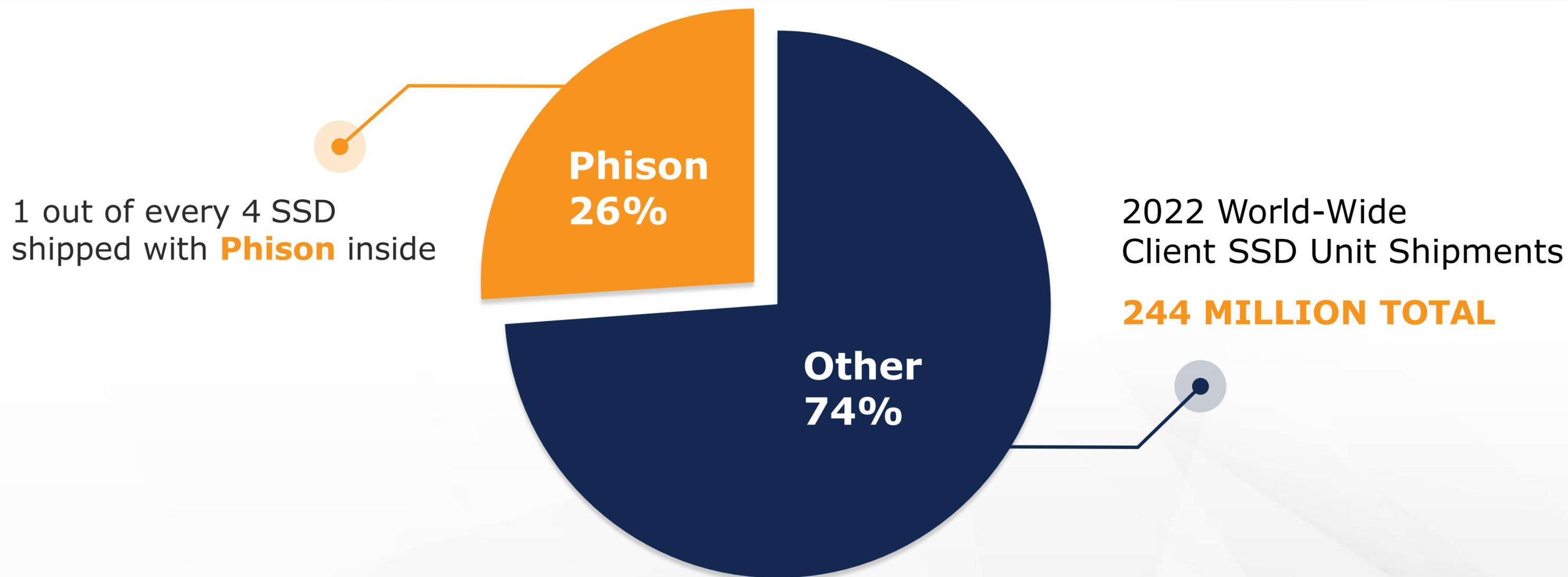
16 EB

Annual NAND Consumption



Phison's World-Wide Influence

Powered by Phison





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What is IMAGIN+



IMAGIN+ Design Services Empowering Innovation



Industry Leading Technology

Enhanced Competitiveness

- ✓ Industry leading NAND technology
- ✓ 2,000+ patents worldwide
- ✓ R&D focused company



Collaborative Resources Sharing

Streamlined Engineering Processes

- ✓ Best-in-class IP, ASIC, FW
- ✓ IMAGIN+ Design Labs for brainstorming, prototyping
- ✓ Global support operations



Efficient Flow for New Product Introduction (NPI)

Accelerated Time-to-market

- ✓ Excellence in program execution
- ✓ Validation resources, robust testing
- ✓ Turnkey storage device expertise



IMAGIN⁺ Process - Easy as 1,2,3

Step 1

Brainstorming, specs

Complete NDA, discuss specs and objectives.
Develop customer advantages with IMAGIN+

Step 2

Business plan review

Phison provides cost estimates, program schedule,
and payment milestones

Step 3

Document scope of work, execution

Execute MOU or SOW, launch project!



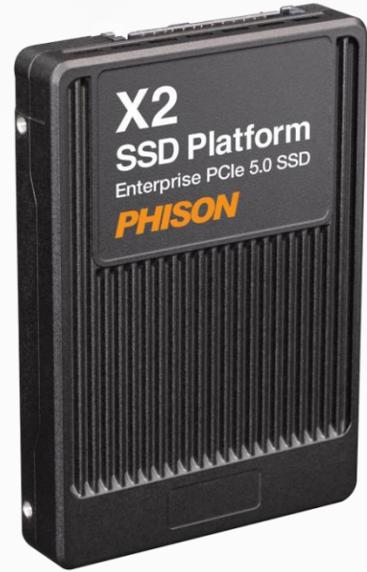
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Product Showcase FMS 2023

PS5302-X2 Gen 5 Enterprise SSD



PS5302-X2 SSD

Designed to be the best of PCIe Gen5 performance, features, endurance, and economics for enterprise applications.

Phison is dedicated to developing advanced SSD technology to provide the industry with increased density, higher performance and power efficiency for all mass capacity storage providers.

Specification

- **Interface : PCIe 5.0 x 4**
- **Protocol : NVMe 2.0**
- **Capacity : Up to 64TB**
- **Form Factor : U.2 / E3.S**
- **DWPD : 1 and 3 DWPD**
- **MTBF : 2.5 million hours**
- **Warranty : 5 years**

Features

- **DDR5 enablement**
- **Dual-port design**
- **Zone-namespaces**
- **Ultra-low latency**
- **Power loss Protection**
- **MF-QoS**
- **Name Space: 256**

Performance

Seq. Read		14,000 MB/s
Seq. Write		12,000 MB/s
Ran. Read		3,000K IOPS
Ran. Write		800K IOPS

PS5026-E26 Max14um Gen5 SSD



PS5026-E26 Max14um SSD

E26 tuned to maximize the full bandwidth of PCIe Gen5. E26 was made for 2400MT/s NAND. **The first consumer SSD to surpass 1,000 MB/s in UL PCMark 10 Storage, Quick, Data Tests and UL 3DMark Storage Test.**

On display with Frore Systems AirJet solid-state cooling technology.

Specification

- Interface : PCIe 5.0 x 4
- Protocol : NVMe 2.0
- Capacity : Up to 8TB
- Form Factor : M.2 2280

Features

- Fastest Consumer SSD
- 14.2GB/s on Intel Z790
- 14.7GB/s on AMD X670E
- 2400MT/s Micron B58R

Performance

Seq. Read		14,000 MB/s
Seq. Write		12,000 MB/s
Ran. Read		1,500K IOPS
Ran. Write		1,600K IOPS

PS5027-E27T Gen4 DRAMless for Client



PS5027-E27T SSD

The E27T delivers on the promise of low-power PCIe Gen4 performance in mobile devices for gaming and general PC computing. Put the power of 7,000 MB/s in your notebook.

On display **enabling both Micron B58R 2400MT/s and Kioxia BiCS6 2400MT/s NAND** in desktop and notebook systems.

Specification

- **Interface : PCIe 4.0 x 4**
- **Protocol : NVMe 2.0**
- **Capacity : Up to 8TB**
- **Form Factor : M.2 2280**
- **HMB : Supported**

Features

- **3600MT/s enablement**
- **TSMC 12nm**
- **4 Channels, 16 CE**
- **3d TLC, QLC NAND Flash**
- **DRAMless Design**
- **TCG OPAL 2.01**
- **8mm x 12.5mm**

Performance

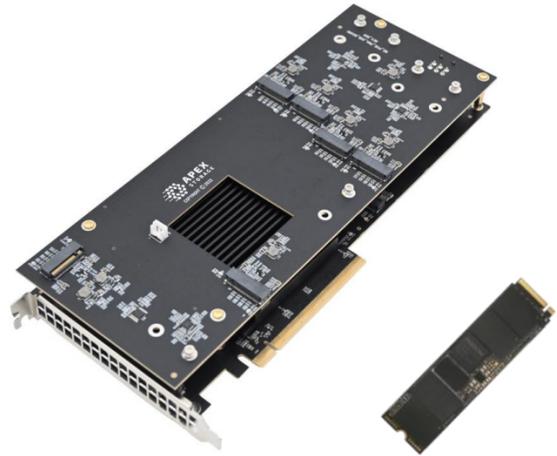
Seq. Read		7,400 MB/s
Seq. Write		6,700 MB/s
Ran. Read		1,200K IOPS
Ran. Write		1,200K IOPS

PS5018-E18 pSLC High Endurance Champion

PS5018-E18 pSLC SSD

Take your 100% write workload to another level with exceptional performance and up to 43 drive writes per day (DWPD).

On display with the **Apex Systems X21** add-in card that enables 21 M.2 2280 SSDs in a single PCIe Gen4 x16 slot **delivering over 30GB/s sequential read throughput and over 21M random read IOPS.**



Specification

- **Interface : PCIe 4.0 x 4**
- **Protocol : NVMe 1.4**
- **Capacity : Up to 2560 GB**
- **Form Factor : M.2 2280 SS/DS**

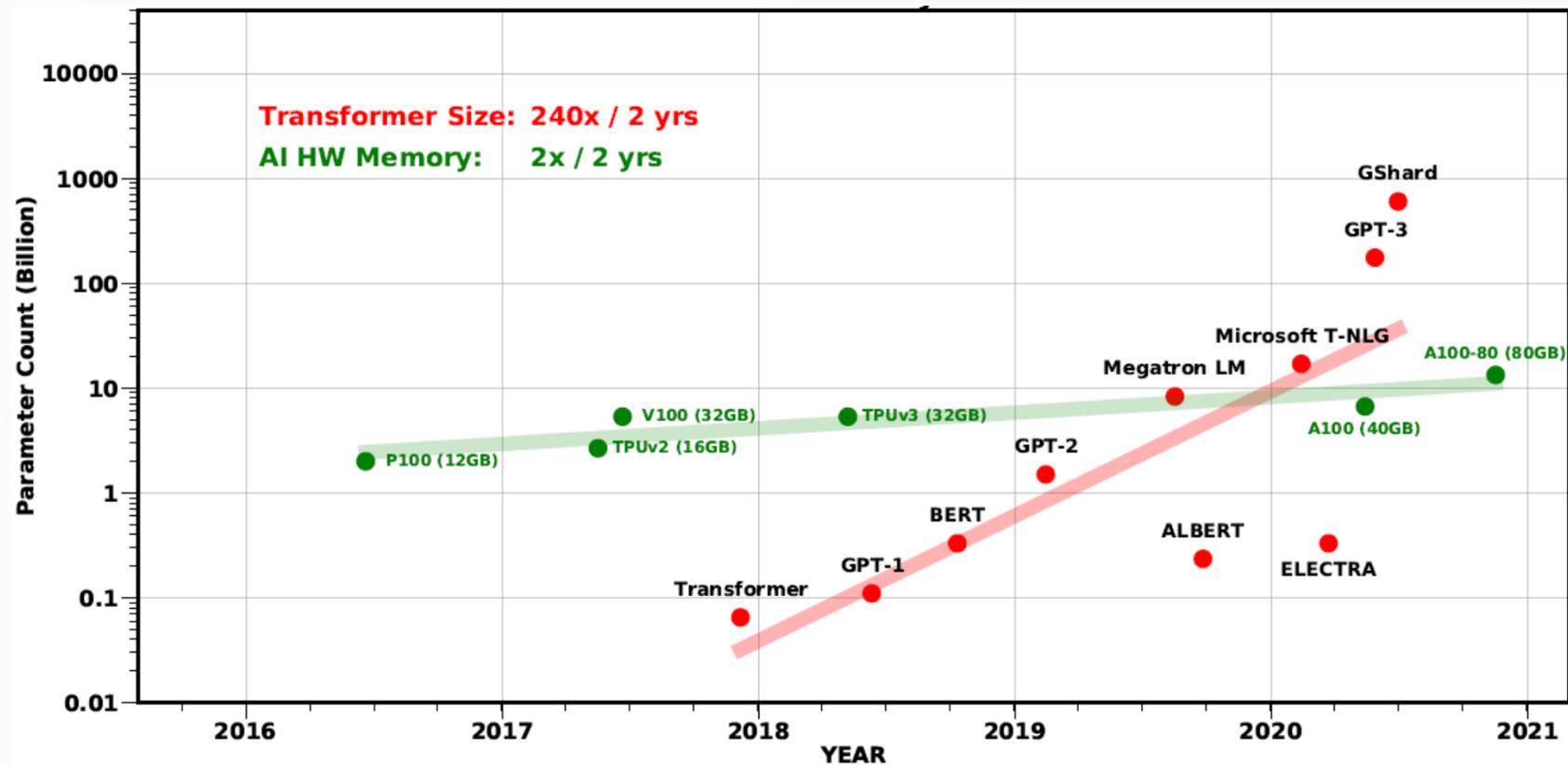
Features

- **Proven Controller / Design**
- **pSLC Performance**
- **Ultra-low latency**
- **End-to-End Data Path Protection**
- **SmartECC**
- **BiCS5**

Performance

Seq. Read		7,200 MB/s
Seq. Write		6,500 MB/s
Ran. Read		1,000K IOPS
Ran. Write		1,000K IOPS

Rapid Growth of AI Model Parameters



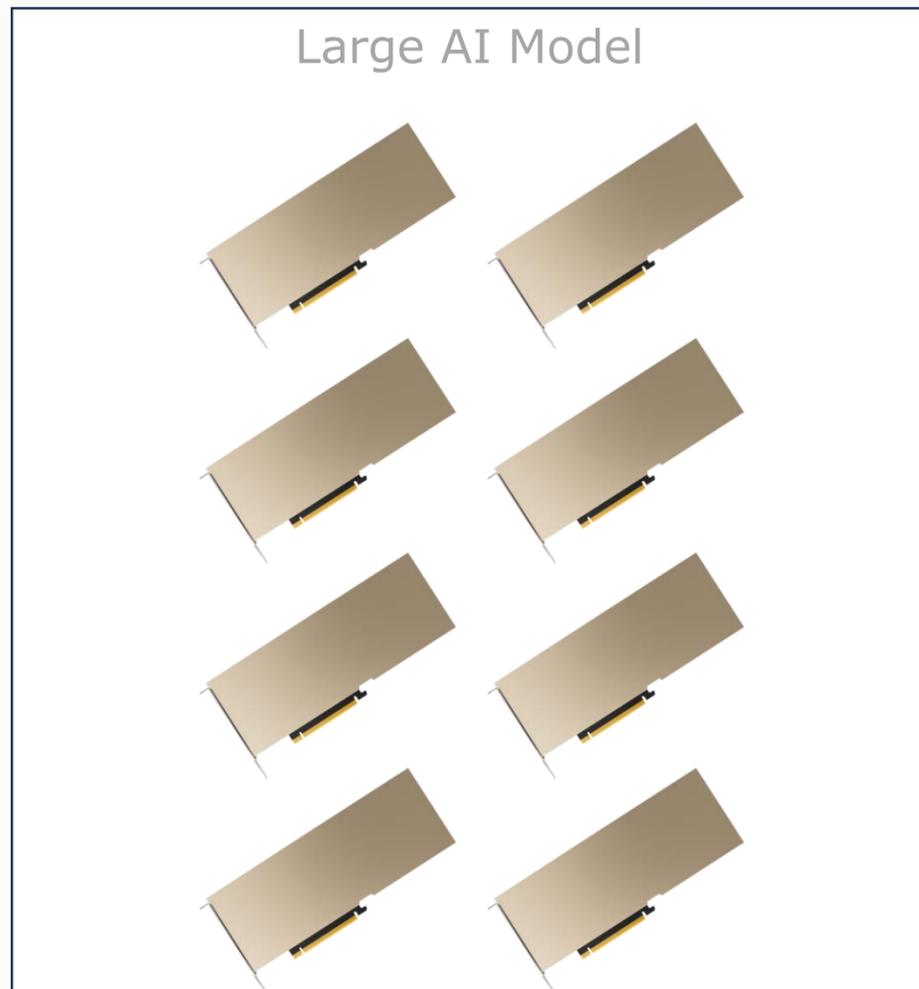
- More computation and memory are required as model parameters increase significantly
- **GPU memory size cannot scale** with AI model, especially for the Large Language Model (LLM)
- **High DRAM costs** limit memory capacity expansion
- The limited DRAM capacity becomes the **bottleneck** of AI model size

Resource : AI and Memory Wall, <https://medium.com/riselab/ai-and-memory-wall-2cb4265cb0b8>

Phison 'aiDAPTIV+' service solution expands NAND storage in the AI application market

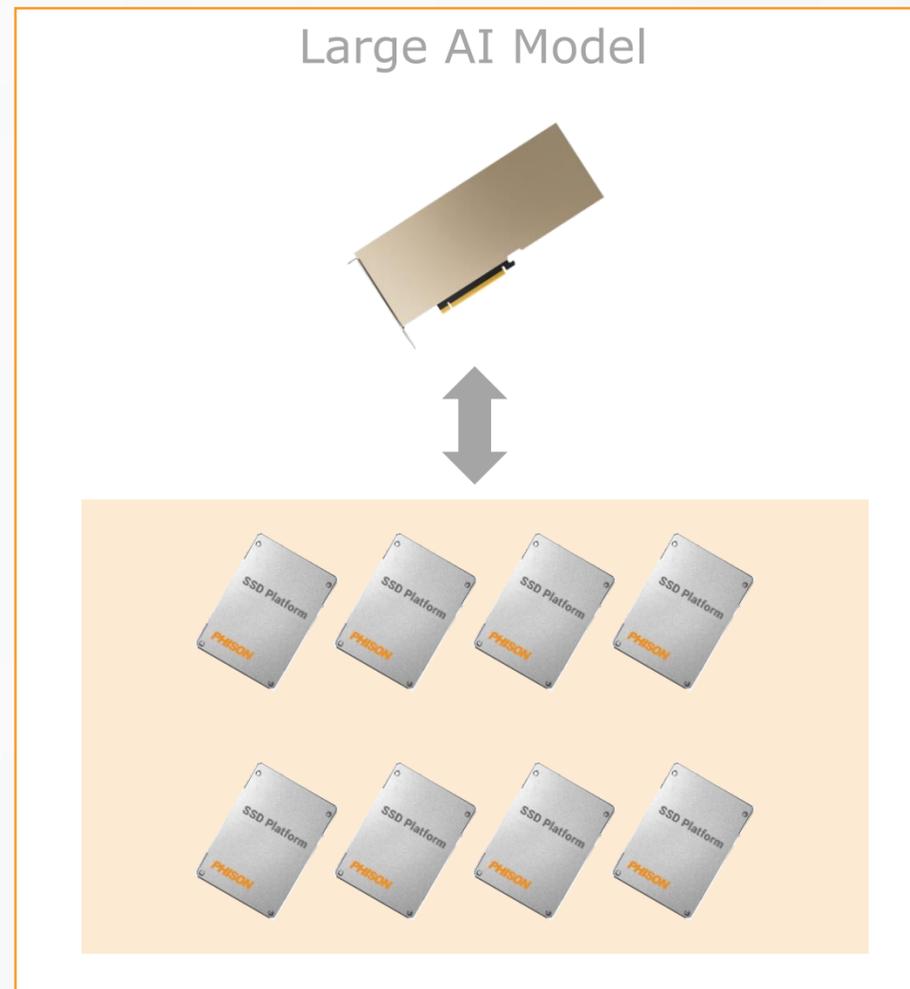
Current AI Computing Architecture

Millions of GPU Cards



Phison's aiDAPTIV+ AI Computing Architecture

Few GPU Cards + SSDs



- Minimize the numbers of GPU cards and save cost significantly
- Suitable for small/medium organizations

**Adequate Performance
With Lower Cost**

The current market segmentation of AI computing architectures

Large Cloud Service Providers

- Super fast performance
- Millions of users
- Open for worldwide
- More budget

Phison Focus

Small/Medium Organizations

- Moderate performance
- Hundreds of users
- Private use
- Customization required
- Less budget

LLM Training Benchmark

Current Architecture

- **8 GPUs** are required to run the specified model size under the given testing conditions
- **Fewer than 8 GPUs** cannot handle model training due to **insufficient memory size**
- The total training time takes **3 days** with **8 GPU cards**



Phison aiDAPTIV+

- It is possible to train models with fewer GPU cards
- Memory swap with Phison aiDAPTIV+:

# of GPU Cards	Total Training Time	Predicted Cost Reduction
4	9 days	50% ↓
2	18 days	75% ↓
1	36 days	88% ↓



Testing Condition:

- Vicuna-13B F16, Batch 32, Sequence 1024
- AMD RX7900XTX(24GB) / Nvidia 4090(24GB)

Thank You!



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