

Lenovo ThinkAgile HX V3 Systems Enhanced with New AMD Processors

Solution Brief

Business Trends

Accelerating Hybrid Cloud Adoption: The growth of technology, cloud and data-driven ecosystems bring the need for on-premise infrastructure to meet hybrid cloud requirements. Servers need to have virtualization and hybrid cloud capabilities – and be able to scale and operationalize quickly. Also, due to cost and operational factors a variety of workloads are being migrated back to on-premises infrastructure. This trend means businesses need faster servers and storage to achieve the performance and low latency required.

Infrastructure and Workloads Modernization: Many business-critical applications - database, VDI, data science and AI/ML workloads - need increased processing and data storage capabilities. Ever growing data and AI/ML workloads require processors with built-in acceleration and servers with high-speed memory, network adapters, drives and interconnects that are pre-tested and pre-validated engineered solutions to reduce deployment complexities.

Lenovo Solution

Lenovo ThinkAgile HX645 V3 and HX665 V3 Integrated Systems and Certified Nodes are hyperconverged systems featured with 4th generation AMD EPYC™ processors and Nutanix software to address these customer trends and lower operations management. The new 4th Gen AMD EPYC processors offer up to 96 cores, up to 3.6 GHz clock speed, up to 6TB memory, and support for PCIe 5.0 and NVMe drives.

ThinkAgile HX V3 systems support all flash, hybrid and storage dense configurations to meet different workload performance and capacity requirements.

Highlights

- **Realize up to 100% better performance on workloads** with the 50% greater number of cores in Lenovo servers equipped with 4th Gen AMD EPYC processors than on similar servers equipped with AMD's previous generation processors.
- Improve performance of critical applications, Big Data and AI/ML solutions with higher cores, embedded accelerators, GPU, DPU, DDR5 and PCIe Gen 5 components
- Enjoy seamless support for running Nutanix solutions for hybrid cloud, containers, and Generative AI workloads.

ThinkAgile HX V3 Systems

Lenovo ThinkAgile HX Series V3 servers powered by 4th Gen AMD EPYC processors provide increased performance, bandwidth and speed than ThinkAgile HX V2 servers with 3rd Gen AMD EPYC processors.

Applications where the servers would excel include:

- ROBO (Remote Office / Branch Office)
- Virtual Desktops
- Databases and Data Warehouses
- SAP Business Applications
- ERP and CRM applications
- Data Science and AI/ML
- Server Consolidation



ThinkAgile HX645 V3



ThinkAgile HX665 V3

Lenovo ThinkAgile HX V3 servers are available as Integrated Systems and Certified Nodes. Both are pre-validated and factory integrated systems with Lenovo hardware, Nutanix software, and deployment services. Integrated systems provide a quick and convenient path to implement a hyperconverged solution powered by Nutanix and a single point of contact provided by Lenovo for purchasing, deploying, and supporting the solution. HX Certified Nodes come with optional Nutanix software and services. ThinkAgile HX V3 systems also support storage heavy configurations to address bid data and object storage solutions enabled by Nutanix Unified Storage.

ThinkAgile HX V3 with 4th Gen AMD EPYC Processors

Table 1. ThinkAgile HX V3 Models with 4th Gen AMD EPYC processors

Model	HX645 V3	HX665 V3	HX665 V3 Storage
Configuration	All Flash	All FlashHybrid	All FlashHybrid
Form Factor	1U 2S	2U 2S	2U 2S
Memory	6 TB Maximum	6 TB Maximum	6 TB Maximum
GPU	Up to 2x single-width GPUs	No	No
Drives NVMe/SAS/SATA	12 Maximum4 NVMe	40 Maximum8 NVMe	16 Maximum
PCIe 5.0	3 Slots	10 Slots	10 Slots
OCP 3.0	1x 1Gb, 10Gb, 25Gb	1x 1Gb, 10Gb, 25Gb	1x 1Gb, 10Gb, 25Gb
Hypervisor	Nutanix AHV, VMware ESXi	Nutanix AHV, VMware ESXi	
HX Integrated System	7D9MCTO1WW	7D9NCTO1WW	7D9NCTO2WW
HX Certified Node	7D9MCTO2WW	7D9NCTO3WW	7D9NCTO4WW

4th Gen AMD EPYC Processors

4th Gen AMD EPYC processors:

- Support up to 96 cores per processor, core speeds of up to 4.1 GHz, and TDP ratings of up to 360W.
- 1 Socket systems support up to 12 TruDDR5 memory DIMMs and 2 Socket systems support up to 24 TruDDR5 memory DIMMs with two processors. Each processor has 12 memory channels and 1 DIMM per channel. With 1 DIMM installed per channel (12 DIMMs total per processor), memory operates at 4800 MHz.
- Supports 12x NVMe drives without oversubscription of PCIe lanes

Table 2. 4th Generation AMD EPYC Processors

TDP	16-48 Cores	64-96 Cores
<=250W	EPYC 9124 16C 200W 3.0GHz EPYC 9224 24C 200W 2.5GHz EPYC 9254 24C 200W 2.9GHz EPYC 9334 32C 210W 2.7GHz	
251-300W	EPYC 9354 32C 280W 3.25GHz EPYC 9354P 32C 280W 3.25GHz EPYC 9374F 32C 320W 3.85GHz EPYC 9454 48C 290W 2.75GHz EPYC 9454P 48C 290W 2.75GHz	EPYC 9534 64C 280W 2.45GHz EPYC 9634 84C 290W 2.25GHz
>300W	EPYC 9174F 16C 320W 4.1GHz EPYC 9274F 24C 320W 4.05GHz EPYC 9474F 48C 360W 3.6GHz	EPYC 9554 64C 360W 3.1GHz EPYC 9554P 64C 360W 3.1GHz EPYC 9654 96C 360W 2.4GHz EPYC 9654P 96C 360W 2.4GHz

Performance Gain from 3rd Gen AMD EPYC Processors

4th Gen AMD EPYC processors support more cores, DDR5 and enhanced features for virtualization and acceleration and provide better performance than 3rd Gen AMD EPYC processors. Here is the comparison between AMD EPYC 7763 64C vs. AMD EPYC 9654 96C.

- Up to 15% increase in performance per watt efficiency
- Up to 85% increase in middle tier application transaction throughput performance
- Up to 60% increase in high performance compute workload (GFLOPS)
- Up to 90% increase in integer and floating point operations
- Up to 100% increase in memory bandwidth performance

Nutanix Cloud Platform with ThinkAgile HX V3

Nutanix Cloud Platform (NCP) is a unified solution built on top of hyperconverged infrastructure to address hybrid cloud requirements and simplify operations for different workload scenarios. Lenovo ThinkAgile HX systems support NCP to provide reliable infrastructure as a foundation for a variety of use cases in hybrid cloud deployments. The platform comprises of the following key components which can be chosen based on the solution requirements:

Nutanix Cloud Infrastructure is a software defined infrastructure solution with compute, storage and networking for virtual machines and containers that can be deployed in private data centers on the hardware of your choice or in public clouds. The core platform is designed with AOS Storage, AHV, Karbon (Kubernetes Engine), Leap (Disaster Recovery) and Flow Network Security and Virtual Networking.

Nutanix Cloud Manager provides infrastructure management and operational support to build, manage and monitor deployments of virtual machines, containers and applications. It also delivers insights and automated remediation. The management stack includes Prism (Operations and Management), Calm (Self Service), Beam (Cost Governance) and Security Central.

Nutanix Unified Storage is software defined storage for multiple protocol volumes, files, and objects with Mine integrated backup.

Nutanix Virtual Desktop infrastructure (VDI) enables delivering virtual apps and desktops to users from public, private, and hybrid cloud infrastructure and supports Citrix, VMware Horizon, and Nutanix Frame platforms.

Nutanix Database Service (NDB) is a database as a service solution that provides management and deployment across hybrid multi-cloud environments for database engines like PostgreSQL®, MySQL®, Microsoft® SQL Server, and Oracle® Database.

Prism Central is the global control plane for Nutanix. Many of the Nutanix Cloud Platform components can be deployed as virtual machines from Prism Central. Nutanix NCP software editions are available on all Lenovo ThinkSystem and ThinkAgile HX models based on Nutanix Portfolio 2.0 (PnP) Licensing Model.

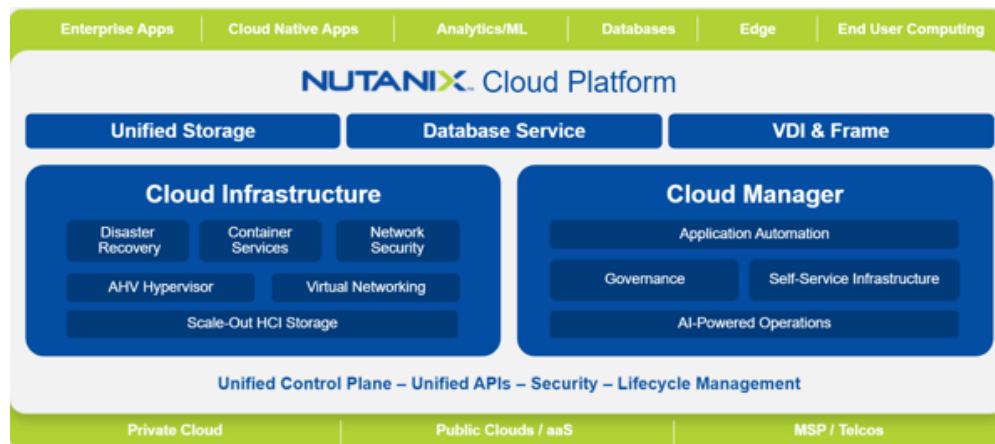


Figure 1. Nutanix Cloud Platform

Nutanix Licensing

Table 3. Nutanix Licensing

License Tier	Nutanix Cloud Platform (NCP)	Nutanix Cloud Infrastructure (NCI)	Nutanix Cloud Manager (NCM)	NCI-Data
Ultimate	NCI Ultimate NCM Ultimate	Advanced DR: Sync, Near-Sync Runbook Security: Micro-segmentation, Encryption Cloud Native: Kubernetes Services	Application Automation Security General	No Mseg No Karbon
Pro	NCI Ultimate NCI Pro	Multi-site Async DR Overlay Networking	Self Service Cost Governance	No Flow Networking
Starter	NCI Pro NCM Pro	AOS Storage + Compression + Dedup	AI Operations	No AHV Support

Use Case: Red Hat OpenShift Container Platform on ThinkAgile HX V3 Systems

The evolution of microservices, containers, DevOps/DevSecOps and hybrid cloud deployment requires a first in class container orchestration platform and robust software defined infrastructure solution without compromising performance and security. Lenovo ThinkAgile HX with 4th Gen AMD EPYC processors and Nutanix AHV provide a solid base to enable Red Hat OpenShift container application platform to develop and deploy modern applications by substantially hosting more containers per node. Red Hat OpenShift on Nutanix Cloud Platform is an enterprise grade unified solution stack to meet hybrid cloud deployments and accelerate cloud native applications at scale.

Nutanix AHV is a Red Hat certified hypervisor and Red Hat Enterprise Linux is certified on Nutanix AHV. Lenovo ThinkAgile HX systems are designed to outperform for a wide range of workloads, and with Lenovo Open Cloud Automation (LOCA) simplify deployment, provisioning and management of Red Hat OpenShift infrastructure. Refer to the Lenovo reference architecture [RedHat OpenShift on Lenovo Servers](#) for a detailed design.

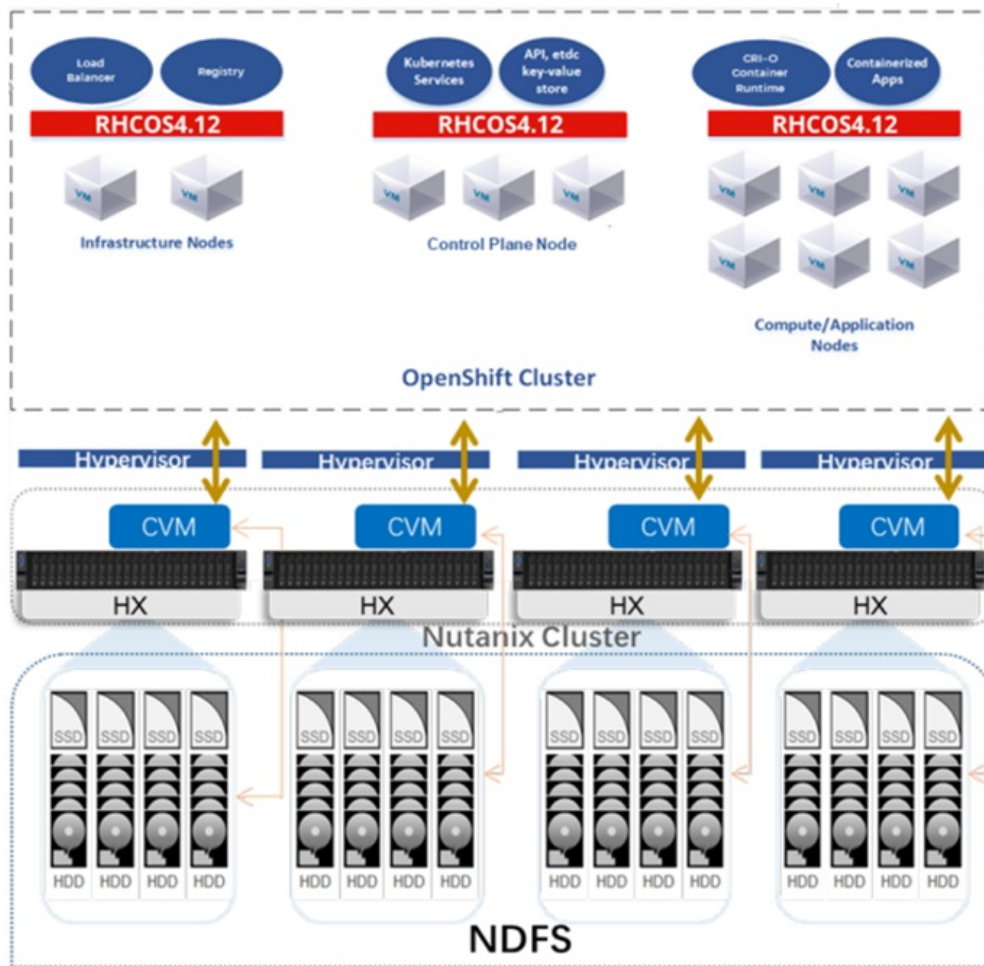


Figure 2. Red Hat OpenShift on Lenovo ThinkAgile HX V3 Systems

Use Case: AI/ML Workloads on ThinkAgile HX V3 Systems

NVIDIA AI Enterprise software provides curated frameworks, models, and data science tools for AI and ML workflows, all of which are certified to seamlessly integrate with Nutanix AHV. Nutanix clusters currently support a variety of NVIDIA GPU models and now the NVIDIA AI Enterprise software for analytics and ML tools running on AHV.

ThinkAgile HX V3 systems with 4th Gen AMD EPYC processors with higher core and clock speed provide the ideal platform for running many analytics and machine learning inference workloads. With support for high end NVIDIA GPUs, it provides the foundational infrastructure to train and deploy many deep learning and Generative AI models at on-premises.

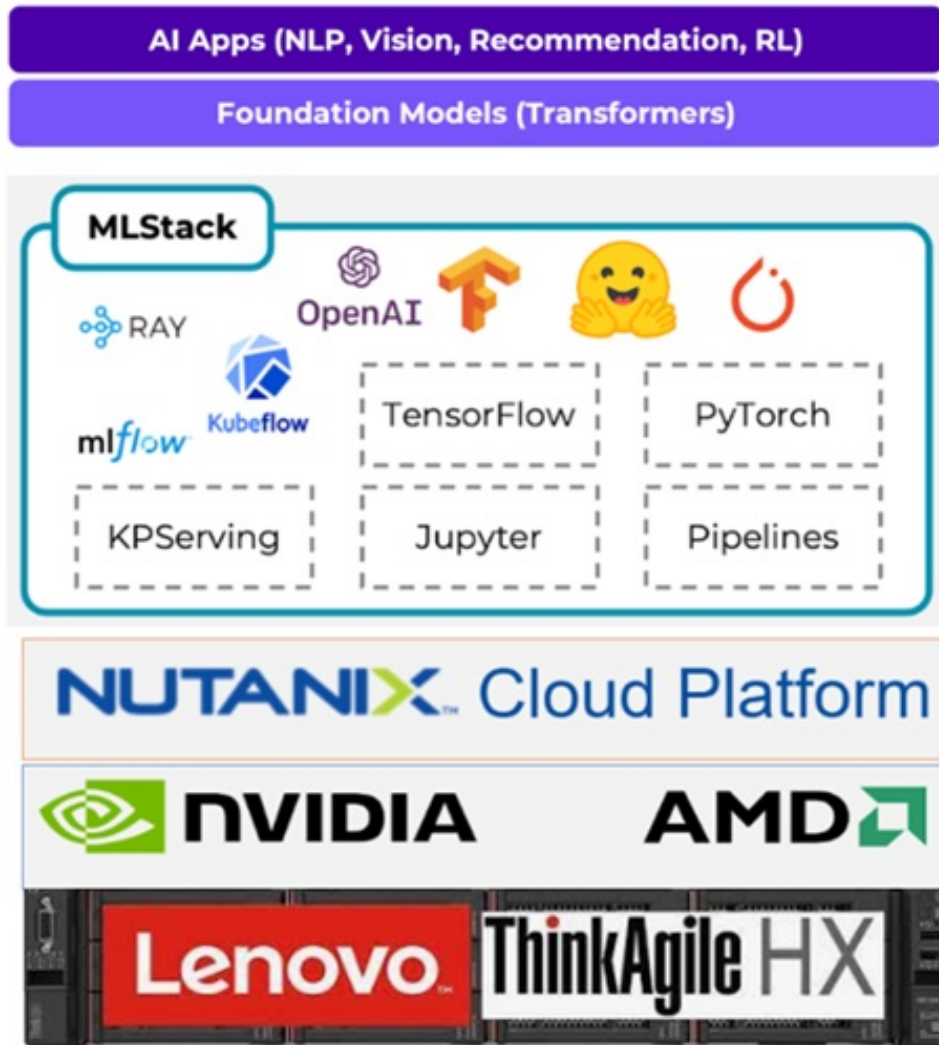


Figure 3. AI/ML Workloads on Lenovo ThinkAgile HX V3 Systems

Bill of Material : ThinkAgile HX645 V3 All Flash Configuration with Nutanix

Table 4. Bill of Materials

Part number Feature code	Product Description	Qty
7D9MCTO1WW	Server : Lenovo ThinkAgile HX645 V3 Integrated System	1
BSQJ	HX645 V3 Base	1
BVGL	Data Center Environment 30 Degree Celsius / 86 Degree Fahrenheit	1
B15S	Nutanix SW Stack on Nutanix AHV	1
BM84	ThinkAgile HX Remote Deployment	1
BVKV	Nutanix Cloud Platform (NCP) Pro Software License with Mission Critical Support	1
BREC	ThinkSystem AMD EPYC 9334 32C 210W 2.7GHz Processor	2
BQ26	ThinkSystem SR645 V3/SR635 V3 1U High Performance Heatsink	2
BQ3E	ThinkSystem 32GB TruDDR5 4800MHz (1Rx4) 9x4 RDIMM-A	16
B8P1	ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA	1
BC4V	Non RAID NVMe	1
B8MX	ThinkSystem 1U 10x2.5" (6x SAS/SATA 4x AnyBay) Backplane	1
B0SW	Nutanix Flash Node Config	1
BK7L	ThinkSystem 2.5" S4620 3.84TB Mixed Use SATA 6Gb HS SSD	4
BM8X	ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit	1
BTTX	M.2 SATA	1
BQ1Z	ThinkSystem M.2 5400 PRO 240GB Read Intensive SATA 6Gb NHS SSD	1
BN2T	ThinkSystem Broadcom 57414 10/25GbE SFP28 2-Port OCP Ethernet Adapter	1
BLKB	ThinkSystem V3 1U x16/x16 BF PCIe Gen5 Riser1	1
BLK8	ThinkSystem V3 1U LP+FH BF Riser Cage	1
BNFH	ThinkSystem 1100W 230V/115V Platinum Hot-Swap Gen2 Power Supply v3	2
BLKD	ThinkSystem 1U V3 10x2.5" Media Bay w/ Ext. Diagnostics Port	1
BH9M	ThinkSystem V3 1U Performance Fan Option Kit v2	8
B8LA	ThinkSystem Toolless Slide Rail Kit v2	1
BPKR	TPM 2.0	1
BQ2A	ThinkSystem SR645 V3 MB	1
B6C1	Node Cores	64
B6C2	Node Tebibytes	14
9220	Preload by Hardware Feature Specify	1
5977	Select Storage devices - no configured RAID required	1
B7Y0	Enable IPMI-over-LAN	1
BRPJ	XCC Platinum	1
BK14	Low voltage (100V+)	1
BTT5	ThinkAgile HX645 V3 IS	1
BHSS	MI for PXE with RJ45 Network port	1
BU8V	ThinkAgile HX645 V3 - Nutanix IP	1
BPK3	ThinkSystem WW Lenovo LPK	1
AUTQ	ThinkSystem small Lenovo Label for 24x2.5"/12x3.5"/10x2.5"	1

Part number Feature code	Product Description	Qty
BS36	ThinkSystem SR645 V3 Cable, Signal, PCIe G4, MCIOX8-MCIOX8,590mm	1
BA1Z	ThinkSystem 1U CFF RAID to 10x2.5" Backplane SAS/SATA G4 Cable 2	1
BA20	ThinkSystem 1U CFF RAID to 10x2.5" Backplane SAS/SATA G4 Cable 1	1
BPEA	ThinkSystem SR650 V3 MCIO8x to SL8x CBL, PCIe4, CFF RAID INPUT, 700mm	1
BQTX	ThinkSystemCable114	1
BT96	ThinkSystem SR645 V3 Power Cable, MciroHi 2X8 to MicroHi 2X8, 210mm	1
BRQ3	ThinkSystem V3 2U WH CBL, 20Pin, 320mm,Tin-plated	1
BE0E	N+N Redundancy With Over-Subscription/td>	1
AVEN	ThinkSystem 1x1 2.5" HDD Filler	6
B989	ThinkSystem V2 1U Package	1
BQ2P	ThinkSystem SR645 V3 Absolut-RoW RoT Module	1
AUWG	Lenovo ThinkSystem 1U VGA Filler	1
A2HP	Configuration ID 01	2
7S0PCTO3WW	Nutanix P&P Software for ThinkAgile HX	1
SAPU	Nutanix Cloud Platform Pro, Mission Critical Support Per Core, 3Yr	64
B8Q8	ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA Placement	1
5AS7B13064	Hardware Installation (Business Hours) for HX645 V3	1
5MS7B00045	ThinkAgile HX Remote Deployment (up to 3 node cluster)	1
7S0XCTO5WW	XClarity Controller	1
SBCV	Lenovo XClarity XCC2 Platinum Upgrade (FOD)	1

Conclusion

ThinkAgile HX V3 Integrated Systems and Certified Nodes with Nutanix software and 4th Gen AMD EPYC processors provide superior performance, scalability and higher consolidation for different workloads. ThinkAgile HX systems are pre-validated and factory installed with Nutanix AOS. HX systems simplify deployment and enable applications to address latency and security issues seamlessly. These next generation engineered hardware and software solutions from Lenovo and AMD are a one-stop scalable solution for modern application development, hybrid cloud and artificial intelligence / machine learning scenarios with reduced TCO.

Why Lenovo

Lenovo is a US\$70 billion revenue Fortune Global 500 company serving customers in 180 markets around the world. Focused on a bold vision to deliver smarter technology for all, we are developing world-changing technologies that power (through devices and infrastructure) and empower (through solutions, services and software) millions of customers every day.

For More Information

To learn more about Lenovo workload solutions on ThinkAgile HX645 V3 and HX665 V3 servers, contact your Lenovo Business Partner or visit: <https://www.lenovo.com/systems/solutions>

References:

Lenovo ThinkAgile HX645 V3 1U Integrated Systems and Certified Nodes:
<https://lenovopress.lenovo.com/lp1650>

Lenovo ThinkAgile HX665 V3 2U Integrated Systems and Certified Nodes:
<https://lenovopress.lenovo.com/lp1649>

Related product families

Product families related to this document are the following:

- [Nutanix Alliance](#)
- [ThinkAgile HX Series for Nutanix](#)

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This document, LP1873, was created or updated on December 18, 2023.

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