High Density Water Cooled Vector Supercomputer

SX-Aurora TSUBASA B401-8

Evolved for a new era in HPC, AI and IOT.

SX-Aurora TSUBASA B401-8 mainly consists of eight vector engine (VE) cards, and each VE card is equipped with up to 10 vector cores having the world's highest single core performance. 1440 vector cores and 1152 x86_64 cores in a standard height rack, more than doubling the computational power available.

In addition to the base hardware, NEC offers a rich software environment that helps you extract high sustained performance from the NEC's original vector architecture. This includes state-of-the-art tools for AI applications, taking you to a new era of high-performance computing.

NEC SX-Aurora TSUBASA is widely used in R&D environments as well as in areas of high environmental and societal interest, such as natural disaster prevention. This is particularly relevant to the areas of simulation of weather, geophysics, earthquakes as well as tsunami and flooding.

This same vector technology is also a driver of economic growth in areas such as manufacturing and construction design, energy generation, utilization and storage, safety and also optimization of logistics.

The new NEC SX-Aurora TSUBASA High Density Water Cooled Solution provides highly impressive specifications regarding compactness, power consumption, and cooling.

18 servers, each equipped with eight VE cards can be mounted in one standard rack.
With these 144 VE cards, providing 1440 vector cores the computational power density has more than doubled compared to the previous model.

The new generation of VE20 feature up to ten powerful vector cores.

With a peak performance of 24.5TFlops per server with eight VE cards NEC improved the product by 26% compared to the previous model.

48 GByte memory capacity per VE lead to 384GByte of the HBM2 memories per server.

The highly compact server not only provides industry-leading sustained application performance, but also superior sustained performance per cost and per power, reducing the overall TCO.

NEC integrates one vector processor and six HBM2 memories and achieves 1.5TB/s memory bandwidth in order to accelerate memory bandwidth intensive applications like as meteorology codes, CFD codes, etc.
SX-Aurora TSUBASA B401-8 provides the 12.2 TB/s aggregate memory bandwidth with 384 HBM2 memory capacity.

B401-8
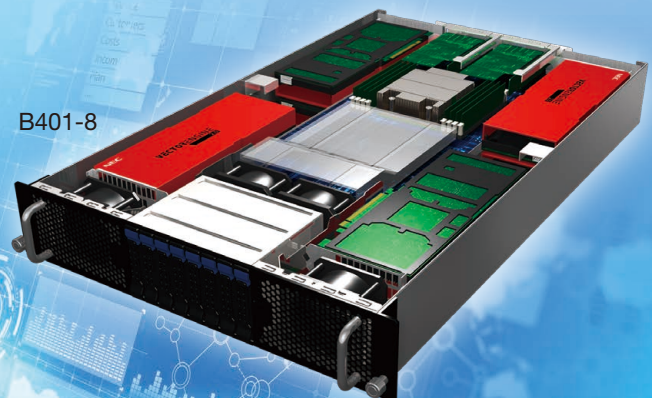
The NEC SX-Aurora TSUBASA addresses the highly important fields of ML and AI applications.

As well as utilizing the vector system in a standalone processing model, NEC SX-Aurora TSUBASA can be utilized in an offload configuration. This in line with contemporary application paradigms, in particular those in DL and AI and allows users to realize rapid benefits without having to completely alter their methodology.

NEC SX-Aurora TSUBASA provides several complementary methods to utilize the VEs and the x86 CPU of the Vector Host (VH) containing the VEs for hybrid applications.

Scalar processes running on the VH can offload vector computation to VEs. Vector applications running on the VE can offload scalar processing to the VH processors.

Hybrid MPI applications are supported, which allows for the communication between processes running on the scalar and on the vector CPUs.

Optimized for seamless expansion of multiple compatible libraries of TensorFlow.

Optimized for seamless expansion of multiple Python compatible libraries such as Numpy.

NEC developed middleware (OSS) "Frovedis" on NEC SX-Aurora TSUBASA accelerates "Apache Spark MLlib" , a data analysis / machine learning framework.

Support for application software which speed up the product development or basic research in manufacturing of semiconductors and automobiles, etc.

SX-Aurora TSUBASA Specifications

Models		
Model name	B401-8	B300-8
# of Vector Hosts (VHs)	1	1
Form factor	2U rack mount	4U rack mount
Vector Engine (VE)		
# of VEs	8	8
VE type	Type 20A/Type 20B	Type 20B
Vector Host (VH)		
CPU/VH	1	2
CPU	AMD EPYC™ Processors	Intel® Xeon® Scalable Processors
Memory configuration	DDR4 DIMM x 8 / CPU	DDR4 DIMM x 6 / CPU
Max. memory capacity /VH	512GB	192GB
Max. disk capacity /VH	SATA SSD 1.92TB	SATA SSD 1.92TB + NVMe SSD 3.2TB
OS	Red Hat Enterprise Linux 8.1 - 8.x / CentOS 8.1 - 8.x	
Interconnect		
InfiniBand	HDR	HDR100
# of HCA	2	2
Bandwidth /HCA	200Gbps	100Gbps
Power and cooling		
Rated power	4.0kW	4.0kW *1
Cooling	Water+Air	Air
Software		
Bundled software	VE controlling software, VE driver	
Software development kit	NEC Software Development Kit for Vector Engine, NEC MPI, NEC MPI/Scalar-Vector Hybrid	

*1 Rated power/Current Rating = 4kW / 180 - 240V 〜: 20 - 19.6A

Vector Engine(VE) Specifications

		Type 20A	Type 20B
Core Specifications			
Clock speed (GHz)		1.6	1.6
Peak performance	DP	307.2	307.2
(GFLOPS)	SP	614.4	614.4
Processor Specifications			
# of cores / processor		10	8
Peak performance	DP	3.0	2.4
(TFLOPS)	SP	6.1	4.9
Memory bandwidth (TB/s)		1.5	1.5
Cache capacity (MB)		16	16
Memory capacity (GB)		48	48

B300-8

⚠ **Safety Notice** Before using this product, please read carefully and comply with the cautions and warnings in manuals such as the Installation Guide and Safety Precautions. Incorrect use may cause a fire, electrical shock, or injury.

Please visit SX-Aurora TSUBASA website for all the lastest updates:

SX-Aurora TSUBASA website
https://www.nec.com/en/global/solutions/hpc

Aurora Forum Website
https://www.hpc.nec/index.en

For further information, please contact:

NEC Corporation (Headquarters)
Mail: Info@hpc.jp.nec.com

NEC Deutschland GmbH (HPC Europe)
Mail: info@nec.de

NEC Technologies India Private Limited
Mail: HPC@India.nec.com