Lenovo EveryScale HPC & AI Software Stack
Product Guide

The Lenovo EveryScale HPC & AI Software Stack combines open-source with proprietary best-of-breed Supercomputing software to provide the most consumable open-source HPC software stack embraced by all Lenovo HPC customers.

It provides a fully tested and supported, complete but customizable HPC software stack to enable the administrators and users in optimally and environmentally sustainable utilizing their Lenovo Supercomputers.

The software stack is built on the most widely adopted and maintained HPC community software for orchestration and management. It integrates third party components especially around programming environments and performance optimization to complement and enhance the capabilities, creating the organic umbrella in software and service to add value for our customers.

The software stack offers key software and support components for orchestration and management, programming environments and services and support, as shown in the following figure.

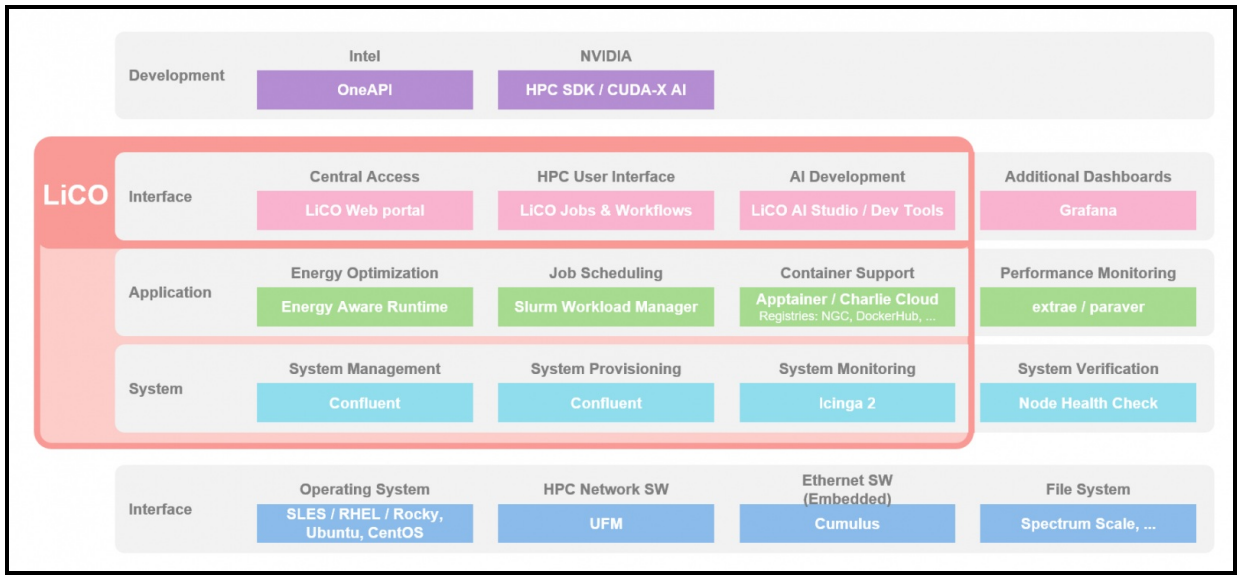

Figure 1. Lenovo EveryScale HPC & AI Software Stack

Did you know?

Lenovo EveryScale HPC & AI Software Stack is a modular software stack tailored to our customer's needs. Thoroughly tested, supported and periodically updated, it combines the latest open-source HPC software releases to enable organizations with an agile and scalable IT infrastructure.

Benefits

The Lenovo EveryScale HPC & AI Software Stack provides the following benefits to customers.

Overcoming the Complexity of HPC Software

An HPC system software stack consists of dozens of components, that administrators must integrate and validate before an organization's HPC applications can run on top of the stack. Ensuring stable, reliable versions of all stack components is an enormous task due to the numerous interdependencies. This task is very time consuming because of the constant release cycles and updates of individual components.

The Lenovo EveryScale HPC & AI Software Stack is fully tested, supported and periodically updated to combine the latest open-source HPC software releases, enabling organizations with an agile and scalable IT infrastructure.

Benefits of the Open-source Model

Going forward, in IDC's opinion, the development model exemplified by Linux is more workable. In this model, stack development is driven primarily by the open-source community and vendors offer supported distributions with additional capabilities for customers that require and are willing to pay for them. As the Linux initiative demonstrates, a community-based model like this has major advantages for enabling software to keep pace with requirements for HPC computing and storage hardware systems.

This model delivers new capabilities faster to users and makes HPC systems more productive and higher returning investments.

A fair number of foundational open source HPC software components already exist (e.g., Open MPI, Rocky Linux, Slurm, OpenStack, and others). Many HPC community members are already taking advantage of these.

Customers will benefit from the HPC community, as the community works to integrate a multitude of components that are commonly used in HPC systems and are freely available for open source distribution.

The key open-source components of the software stack are:

- Confluent Management

  Confluent is Lenovo-developed open-source software designed to discover, provision, and manage HPC clusters and the nodes that comprise them. Confluent provides powerful tooling to deploy and update software and firmware to multiple nodes simultaneously, with simple and readable modern software syntax.

- Slurm Orchestration

  Slurm is integrated as an open source, flexible, and modern choice to manage complex workloads for faster processing and optimal utilization of the large-scale and specialized high-performance and AI resource capabilities needed per workload provided by Lenovo systems. Lenovo provides support in partnership with SchedMD.

- LiCO Webportal

  Lenovo Intelligent Computing Orchestration (LiCO) is a Lenovo-developed consolidated Graphical User Interface (GUI) for monitoring, managing and using cluster resources. The web portal provides workflows for both AI and HPC, and supports multiple AI frameworks, including TensorFlow, Caffe, Neon, and MXNet, allowing you to leverage a single cluster for diverse workload requirements.

- Energy Aware Runtime

  EAR is a powerful European open-source energy management suite supporting anything from monitoring over power capping to live-optimization during the application runtime. Lenovo is collaborating with Barcelona Supercomputing Centre (BSC) and EAS4DC on the continuous development and support and offers three versions with differentiating capabilities.

Software components

Components are covered in the following sections:

Orchestration and management

The following orchestration software is available with Lenovo EveryScale HPC & AI Software Stack:

- **Confluent** (Best Recipe interoperability)

  Confluent is Lenovo-developed open source software designed to discover, provision, and manage HPC clusters and the nodes that comprise them. Our Confluent management system and LiCO Web portal provide an interface designed to abstract the users from the complexity of HPC cluster orchestration and AI workloads management, making open-source HPC software consumable for every customer. Confluent provides powerful tooling to deploy and update software and firmware to multiple nodes simultaneously, with simple and readable modern software syntax. Additionally, Confluent's performance scales seamlessly from small workstation clusters to thousand-plus node supercomputers. For more information, see the Confluent documentation.

- **Lenovo Intelligent Computing Orchestration** (Best Recipe interoperability)

  Lenovo Intelligent Computing Orchestration (LiCO) is a Lenovo-developed software solution that simplifies the management and use of distributed clusters for High Performance Computing (HPC) and Artificial Intelligence (AI) environments. LiCO provides a consolidated Graphical User Interface (GUI) for monitoring and usage of cluster resources, allowing you to easily run both HPC and AI workloads across a choice of Lenovo infrastructure, including both CPU and GPU solutions to suit varying application requirements.

  LiCO Web portal provides workflows for both AI and HPC, and supports multiple AI frameworks, including TensorFlow, Caffe, Neon, and MXNet, allowing you to leverage a single cluster for diverse workload requirements. For more information, see the LiCO product guide.

- **LiCO customization service**
  Lenovo Intelligent Computing Orchestration (LiCO) customization services enable customers to request customized features tailored for their own needs. The service is evaluated and quoted in the form of man-days, based on the actual order list.
  HPC solution sellers need to provide pre-sales support, collaborate with HPC architects, and communicate with LiCO's R&D team (Ding Hong dinghong1@lenovo.com) for workload evaluations. A quote is provided by Lenovo based on the output SOW and analysis of the workload. After the sellers place an order, they will email the R&D team to request implementation. The LiCO R&D team will deliver the work based on the order content and SOW.

- **Slurm**

  Slurm is a modern, open-source scheduler designed specifically to satisfy the demanding needs of high-performance computing (HPC), high throughput computing (HTC) and AI. Slurm is developed and maintained by SchedMD® and integrated within LiCO. Slurm maximizes workload throughput, scale, reliability, and results in the fastest possible time while optimizing resource utilization and meeting organizational priorities. Slurm automates job scheduling to help admin and users manage the complexities of on-prem, hybrid, or cloud workspaces. Slurm workload manager executes faster and is more reliable ensuring increased productivity while decreasing costs. Slurm's modern, plug-in-based architecture runs on a RESTful API supporting both large and small HPC, HTC, and AI environments. Allow your teams to focus on their work while Slurm manages their workloads.

- **NVIDIA Unified Fabric Manager (UFM)** (ISV supported)

  NVIDIA Unified Fabric Manager (UFM) is InfiniBand networking management software that combines enhanced, real-time network telemetry with fabric visibility and control to support scale-out InfiniBand data centers. For more information, see the NVIDIA UFM product page.

  The two UFM offerings available from Lenovo are as follows:

- **UFM Telemetry** for Real-Time Monitoring

  The UFM Telemetry platform provides network validation tools to monitor network performance and conditions, capturing and streaming rich real-time network telemetry information, application workload usage, and system configuration to an on-premises or cloud-based database for further analysis.

- **UFM Enterprise** for Fabric Visibility and Control

  The UFM Enterprise platform combines the benefits of UFM Telemetry with enhanced network monitoring and management. It performs automated network discovery and provisioning, traffic monitoring, and congestion discovery. It also enables job schedule provisioning and integrates with industry-leading job schedulers and cloud and cluster managers, including Slurm and Platform Load Sharing Facility (LSF).

The following table lists all Orchestration software available with Lenovo EveryScale HPC & AI Software Stack.

Table 1. Orchestration and management

Part number	Feature code	Description
Lenovo Intelligent Computing Orchestration (LiCO) HPC AI version		
7S090004WW	B1YC	Lenovo HPC AI LiCO Software 90 Day Evaluation License
7S09002BWW	S93A	Lenovo HPC AI LiCO Webportal w/1 yr S&S
7S09002CWW	S93B	Lenovo HPC AI LiCO Webportal w/3 yr S&S
7S09002DWW	S93C	Lenovo HPC AI LiCO Webportal w/5 yr S&S
Lenovo Confluent support		
7S090039WW	S9VH	Lenovo Confluent 1 Year Support per managed node
7S09003AWW	S9VJ	Lenovo Confluent 3 Year Support per managed node
7S09003BWW	S9VK	Lenovo Confluent 5 Year Support per managed node
7S09003CWW	S9VL	Lenovo Confluent 1 Extension Year Support per managed node
LiCO customization service		
7S09004HWW	SBF2	Lenovo HPC AI LiCO customization Service per man day
UFM Telemetry		
7S090011WW	S921	NVIDIA UFM Telemetry 1-year License and 24/7 Support for Lenovo clusters
7S090012WW	S922	NVIDIA UFM Telemetry 3-year License and 24/7 Support for Lenovo clusters
7S090013WW	S923	NVIDIA UFM Telemetry 5-year License and 24/7 Support for Lenovo clusters
UFM Enterprise		
7S09000XWW	S91Y	NVIDIA UFM Enterprise 1-year License and 24/7 Support for Lenovo clusters
7S09000YWW	S91Z	NVIDIA UFM Enterprise 3-year License and 24/7 Support for Lenovo clusters
7S09000ZWW	S920	NVIDIA UFM Enterprise 5-year License and 24/7 Support for Lenovo clusters

Programming environment

The following programming software is available with Lenovo EveryScale HPC&AI Software Stack.

- **NVIDIA CUDA**

  NVIDIA CUDA is a parallel computing platform and programming model for general computing on graphical processing units (GPUs). With CUDA, developers are able to dramatically speed up computing applications by harnessing the power of GPUs. When using CUDA, developers program in popular languages such as C, C++, Fortran, Python and MATLAB and express parallelism through extensions in the form of a few basic keywords. For more information, see the NVIDIA CUDA Zone.

- **NVIDIA HPC Software Development Kit**

  The NVIDIA HPC SDK C, C++, and Fortran compilers support GPU acceleration of HPC modeling and simulation applications with standard C++ and Fortran, OpenACC directives, and CUDA. GPU-accelerated math libraries maximize performance on common HPC algorithms, and optimized communications libraries enable standards-based multi-GPU and scalable systems programming. Performance profiling and debugging tools simplify porting and optimization of HPC applications, and containerization tools enable easy deployment on-premises or in the cloud. For more information, see the NVIDIA HPC SDK.

The following table lists the relevant ordering part numbers.

Table 2. NVIDIA CUDA and NVIDIA HPC SDK part numbers

Part number	Description
NVIDIA CUDA	
7S09001EWW	NVIDIA CUDA Support and Maintenance (up to 200 GPUs), 1 Year
7S09001FWW	NVIDIA CUDA Support and Maintenance (up to 500 GPUs), 1 Year
7S09002EWW	NVIDIA CUDA Support and Maintenance (up to 1000 GPUs), 1 Year
7S09002FWW	NVIDIA CUDA Support and Maintenance (up to 5000 GPUs), 1 Year
NVIDIA HPC SDK	
7S090014WW	NVIDIA HPC Compiler Support Services, 1 Year
7S090015WW	NVIDIA HPC Compiler Support Services, 3 Years
7S09002GWW	NVIDIA HPC Compiler Support Services, 5 Years
7S090016WW	NVIDIA HPC Compiler Support Services, EDU, 1 Year
7S090017WW	NVIDIA HPC Compiler Support Services, EDU, 3 Years
7S09002HWW	NVIDIA HPC Compiler Support Services, EDU, 5 Years
7S09001CWW	NVIDIA HPC Compiler Support Services - Additional Contact, 1 Year
7S09002JWW	NVIDIA HPC Compiler Support Services - Additional Contact, 3 Years
7S09002KWW	NVIDIA HPC Compiler Support Services - Additional Contact, 5 Years
7S09001DWW	NVIDIA HPC Compiler Support Services - Additional Contact, EDU, 1 Year
7S09002LWW	NVIDIA HPC Compiler Support Services - Additional Contact, EDU, 3 Years
7S09002MWW	NVIDIA HPC Compiler Support Services - Additional Contact, EDU, 5 Years
7S09001AWW	NVIDIA HPC Compiler Premier Support Services, 1 Year
7S09002NWW	NVIDIA HPC Compiler Premier Support Services, 3 Years
7S09002PWW	NVIDIA HPC Compiler Premier Support Services, 5 Years
7S09001BWW	NVIDIA HPC Compiler Premier Support Services, EDU, 1 Year
7S09002QWW	NVIDIA HPC Compiler Premier Support Services, EDU, 3 Years
7S09002RWW	NVIDIA HPC Compiler Premier Support Services, EDU, 5 Years
7S090018WW	NVIDIA HPC Compiler Premier Support Services - Additional Contact, 1 Year
7S09002SWW	NVIDIA HPC Compiler Premier Support Services - Additional Contact, 3 Years
7S09002TWW	NVIDIA HPC Compiler Premier Support Services - Additional Contact, 5 Years
7S090019WW	NVIDIA HPC Compiler Premier Support Services - Additional Contact, EDU, 1 Year
7S09002UWW	NVIDIA HPC Compiler Premier Support Services - Additional Contact, EDU, 3 Years
7S09002VWW	NVIDIA HPC Compiler Premier Support Services - Additional Contact, EDU, 5 Years

Support components

The following software support is available with Lenovo EveryScale HPC&AI Software.

- **SchedMD Slurm Support for Lenovo HPC Systems**

  Slurm is part of the Lenovo EveryScale HPC & AI Software Stack, integrated as an open source, flexible, and modern choice to manage complex workloads for faster processing and optimal utilization of the large-scale and specialized high-performance and AI resource capabilities needed per workload provided by Lenovo systems.

  SchedMD Slurm Support service capabilities for Lenovo HPC systems include:

  - Level 3 Support: High-performance systems must perform at high utilization and performance to meet end users and management return on the investment expectations. Customers covered by a support contract can reach out to SchedMD engineer experts to promptly resolve complex workload management issues and receive answers back to complex config questions quickly, instead of taking weeks or even months to try to resolve them in-house.
  - Remote Consulting: Valuable assistance and implementation expertise that speeds custom configuration tuning to increase throughput and utilization efficiency on complex and large-scale systems. Customers can review cluster requirements, operating environment, and organizational goals directly with a Slurm engineer to optimize the configuration and meet organizational needs.
  - Tailored Slurm Training: Tailored Slurm expert training that empowers users on harnessing Slurm capabilities to speed projects and increase technology adoption. A customer scoping call before the onsite Instruction ensures coverage of specific use cases addressing organization needs. An in-depth and comprehensive technical training is delivered in a hands-on lab workshop format to help users feel empowered on Slurm best practices in their site-specific use cases and configuration.

- **EAS Service and Support for EAR**

  The Energy Aware Runtime is Open Source under BSD-3 license and EPL-1.0. For professional use cases in production environments, installation (remote) and support services are available. Commercial support as well as implementation services for EAR can be purchased from Lenovo under the EveryScale HPC & AI Software Stack CTO and is delivered through Energy Aware Solutions (EAS). There are three different distributions of EAR: Detective Pro, Optimizer and Optimizer Pro. Detective Pro provides the basic monitoring and accounting capabilities, Optimizer adds the energy optimization and Optimizer Pro the power capping features.

  - For clusters with more than 500 nodes – call for a quote.
  - EAS does not propose installation/training without any support contract.
  - Installation/training and Support prices depend on whether the cluster has only CPUs (Intel or AMD) or CPUS + GPUS (Intel or AMD CPUs and NVIDIA GPUs.
  - As Optimizer Pro and Optimizer goal is to control and/or reduce the power consumption of the system, their yearly support is priced according to the power consumption of the cluster and their associated Support Entitlement per System Power Rating (SPR). At same configuration, Optimizer Pro and Optimizer cluster power consumptions will be identical but their Support Entitlement per System Power Rating (SPR) will be different.
  - Detective Pro is the only service proposed for clusters with a Total System Power less than 127 KW and SPR value less than 10.
  - A spreadsheet is provided to compute the SPR of a cluster and its associated service prices for Detective Pro, Optimizer pro and Optimizer. For the latest spreadsheet and additional information please reach out to the product manager.

- **Intel oneAPI**
  The Intel oneAPI Base & HPC Toolkit is a comprehensive software development suite designed to empower developers in creating high-performance computing (HPC) solutions that exploit the full potential of modern hardware architectures. This toolkit encompasses an array of advanced tools, libraries, and compilers, enabling programmers to efficiently design, optimize, and deploy parallel applications across diverse computing platforms, including CPUs, GPUs, and FPGAs. With a focus on fostering code portability and performance scalability, the Intel oneAPI Base & HPC Toolkit equips developers with the means to enhance productivity, streamline software development, and achieve exceptional performance outcomes in the realm of high-performance computing.
    - For more information, see Intel® oneAPI Base and HPC Toolkit.
    - Target platforms for development and deployment can range from a small system to a large multi-node cluster requiring different support efforts.
    - Support Renewals are available.
    - For Developer-based parts if the team is above 50 Developers (SBF1 and SBEG) – call for a quote.
    - Special pricing for academic research is available.
    - Commercial parts have different part numbers if they are quoted with or without Intel hardware.

The following table lists the relevant ordering part numbers Stack (some of the product numbers are not yet released at the time of writing this product guide

Table 3. SchedMD Slurm Support and EAR Support part numbers

Part number	Description
SchedMD Slurm Support for Lenovo HPC Systems	
7S09001MWW	SchedMD Slurm Onsite or Remote 3-day Training*
7S09001NWW	SchedMD Slurm Consulting w/Sr.Engineer 2REMOTE Sessions**
7S09001PWW	SchedMD L3 Slurm support up to 100 Sockets/GPUs 3Y
7S09001QWW	SchedMD L3 Slurm support up to 100 Sockets/GPUs 5Y
7S09001RWW	SchedMD L3 Slurm support up to 100 Sockets/GPUs additional 1Y
7S09001SWW	SchedMD L3 Slurm support 101-1000 Sockets/GPUs 3Y
7S09001TWW	SchedMD L3 Slurm support 101-1000 Sockets/GPUs 5Y
7S09001UWW	SchedMD L3 Slurm support 101-1000 Sockets/GPUs additional 1Y
7S09001VWW	SchedMD L3 Slurm support 1001-5000+ Sockets/GPUs 3Y
7S09001WWW	SchedMD L3 Slurm support 1001-5000+ Sockets/GPUs 5Y
7S09001XWW	SchedMD L3 Slurm support 1001-5000+ Sockets/GPUs additional 1Y
7S09001YWW	SchedMD L3 Slurm support up to 100 Sockets/GPUs 3Y EDU&GOV
7S09001ZWW	SchedMD L3 Slurm support up to 100 Sockets/GPUs 5Y EDU&GOV
7S090022WW	SchedMD L3 Slurm support up to 100 Sockets/GPUs additional 1Y EDU&GOV
7S090023WW	SchedMD L3 Slurm support 101-1000 Sockets/GPUs 3Y EDU&GOV
7S090024WW	SchedMD L3 Slurm support 101-1000 Sockets/GPUs 5Y EDU&GOV
7S090026WW	SchedMD L3 Slurm support 101-1000 Sockets/GPUs additional 1Y EDU&GOV
7S090027WW	SchedMD L3 Slurm support 1001-5000+ Sockets/GPUs 3Y EDU&GOV
7S090028WW	SchedMD L3 Slurm support 1001-5000+ Sockets/GPUs 5Y EDU&GOV
7S09002AWW	SchedMD L3 Slurm support 1001-5000+ Sockets/GPUs additional 1Y EDU&GOV
EAS Service and Support for EAR	

Part number	Description
7S09001KWW	EAR Energy Detective Pro Worldwide Remote Installation and Training for AMD or Intel CPUs
7S09002XWW	EAR Energy Detective Pro 3-years Worldwide Remote support for AMD or Intel CPUs (flat fee)
7S09002YWW	EAR Energy Detective Pro 5-years Worldwide Remote support for AMD or Intel CPUs (flat fee)
7S09001LWW	EAR Energy Detective Pro 1-year Worldwide Remote support for AMD or Intel CPUs (flat fee)
7S09002WWW	EAR Energy Detective Pro Worldwide Remote Installation and Training for AMD or Intel CPUs + NVIDIA GPUs
7S09002ZWW	EAR Energy Detective Pro 1-year Worldwide Remote support for AMD or Intel CPUs + NVIDIA GPUs (flat fee)
7S090030WW	EAR Energy Detective Pro 3-year Worldwide Remote support for AMD or Intel CPUs + NVIDIA GPUs (flat fee)
7S090031WW	EAR Energy Detective Pro 5-year Worldwide Remote support for AMD or Intel CPUs + NVIDIA GPUs (flat fee)
7S090032WW	EAR Energy Optimizer 1-year Support Entitlement for Energy Monitoring and Optimization per system power rating
7S090033WW	EAR Energy Optimizer 3-year Support Entitlement for Energy Monitoring and Optimization per system power rating
7S090034WW	EAR Energy Optimizer 5-year Support Entitlement for Energy Monitoring and Optimization per system power rating
7S09001JWW	EAR Energy Optimizer Pro 1-year Support Entitlement for Energy Monitoring , Optimization and Power Capping per system power rating
7S090037WW	EAR Energy Optimizer Pro 3-years Support Entitlement for Energy Monitoring, Optimization and Power Capping per system power rating
7S090038WW	EAR Energy Optimizer Pro 5-years Support Entitlement for Energy Monitoring, Optimization and Power Capping per system power rating
7S090035WW	EAR Energy Optimizer Worldwide Remote Installation and Training for AMD or Intel CPUs
7S090036WW	EAR Energy Optimizer Worldwide Remote Installation and Training for AMD or Intel CPUs + NVIDIA GPUs
7S09001GWW	EAR Energy Optimizer Pro Worldwide Remote Installation and Training for AMD or Intel CPUs
7S09001HWW	EAR Energy Optimizer Pro Worldwide Remote Installation and Training for AMD or Intel CPUs + NVIDIA GPUs

* SchedMD Slurm Onsite or Remote 3-day Training: in-depth and comprehensive site-specific technical training. Can only be added to a support purchase.
** SchedMD Slurm Consulting w/Sr.Engineer 2REMOTE Sessions (Up to 8 hrs): review initial Slurm setup, in-depth technical chats around specific Slurm topics & review site config for optimization & best practices. Required with support purchase, cannot be purchased separately.

Note: SchedMD Slurm Consulting w/Sr.Engineer 2REMOTE Sessions option must be selected and locked in for every SchedMD support selection.

SchedMD Slurm Onsite or Remote 3-day Training option must be selected and locked in for every SchedMD Commercial support selection. Optional for EDU & Government support selections.

The following table lists all Intel oneAPI software available with Lenovo EveryScale HPC & AI Software Stack.

Table 4. Intel oneAPI options

Part number	Feature code	Description
Intel oneAPI Commercial		
7S09003DWW	SBDY	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Small System support for oneAPI Cluster runtimes 1YSupp with Intel HW

Part number	Feature code	Description
7S09003EWW	SBDZ	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Small System support for oneAPI Cluster runtimes 3YSupp with Intel HW
7S09003FWW	SBE0	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Small System support for oneAPI Cluster runtimes 4YSupp with Intel HW
7S09003GWW	SBE1	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Small System support for oneAPI Cluster runtimes 5YSupp with Intel HW
7S09003HWW	SBE2	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Medium System support for oneAPI Cluster runtimes 1YSupp with Intel HW
7S09003JWW	SBE3	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Medium System support for oneAPI Cluster runtimes 3YSupp with Intel HW
7S09003KWW	SBE4	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Medium System support for oneAPI Cluster runtimes 4YSupp with Intel HW
7S09003LWW	SBE5	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Medium System support for oneAPI Cluster runtimes 5YSupp with Intel HW
7S09003MWW	SBE6	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Large System support for oneAPI Cluster runtimes 5YSupp with Intel HW
7S09003NWW	SBE7	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Large System support for oneAPI Cluster runtimes 4YSupp with Intel HW
7S09003PWW	SBE8	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Large System support for oneAPI Cluster runtimes 3YSupp with Intel HW
7S09003QWW	SBE9	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Large System support for oneAPI Cluster runtimes 1YSupp with Intel HW
7S09003RWW	SBEA	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 2 Concurrent User Commercial 1YSupp with Intel HW
7S09003SWW	SBEB	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 2 Concurrent User Commercial 31YSupp with Intel HW
7S09003TWW	SBEC	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 5 Concurrent User Commercial 1YSupp with Intel HW
7S09003UWW	SBED	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 5 Concurrent User Commercial 31YSupp with Intel HW
7S09003VWW	SBEE	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 10 Concurrent User Commercial 1YSupp with Intel HW
7S09003WWW	SBEF	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 10 Concurrent User Commercial 31YSupp with Intel HW
7S09004JWW	SBWD	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Small System support for oneAPI Cluster runtimes 1YSupp with non-Intel HW
7S09004KWW	SBWE	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Small System support for oneAPI Cluster runtimes 3YSupp with non-Intel HW
7S09004LWW	SBWF	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Small System support for oneAPI Cluster runtimes 4YSupp with non-Intel HW
7S09004MWW	SBWG	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Small System support for oneAPI Cluster runtimes 5YSupp with non-Intel HW
7S09004NWW	SBWH	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Medium System support for oneAPI Cluster runtimes 1YSupp with non-Intel HW
7S09004PWW	SBWJ	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Medium System support for oneAPI Cluster runtimes 3YSupp with non-Intel HW
7S09004QWW	SBWK	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Medium System support for oneAPI Cluster runtimes 4YSupp with non-Intel HW

Part number	Feature code	Description
7S09004RWW	SBWL	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Medium System support for oneAPI Cluster runtimes 5YSupp with non-Intel HW
7S09004VWW	SBWQ	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Large System support for oneAPI Cluster runtimes 1YSupp with non-Intel HW
7S09004UWW	SBWP	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Large System support for oneAPI Cluster runtimes 3YSupp with non-Intel HW
7S09004TWW	SBWN	Intel oneAPI Base & HPC Toolkit (Multi-Node) Commercial Large System support for oneAPI Cluster runtimes 4YSupp with non-Intel HW
7S09004SWW	SBWM	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 2 Concurrent User Commercial 1YSupp with non-Intel HW
7S09004WWW	SBWR	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 2 Concurrent User Commercial 1YSupp with non-Intel HW
7S09004XWW	SBWS	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 2 Concurrent User Commercial 3YSupp with non-Intel HW
7S09004YWW	SBWT	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 5 Concurrent User Commercial 1YSupp with non-Intel HW
7S09004ZWW	SBWU	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 5 Concurrent Users Commercial 3YSupp with non-Intel HW
7S090050WW	SBWV	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 10 Concurrent User Commercial 1YSupp with non-Intel HW
7S090051WW	SBWW	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 10 Concurrent Users Commercial 3YSupp with non-Intel HW
7S09003XWW	SBEG	Intel oneAPI Base & HPC Toolkit (Multi-Node) - Enterprise-Above 10 Concurrent Users Commercial
Intel oneAPI Academic		
7S09003YWW	SBEH	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Small System support for oneAPI Cluster runtimes with 1YSupp
7S09003ZWW	SBEJ	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Small System support for oneAPI Cluster runtimes with 3YSupp
7S090040WW	SBEK	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Small System support for oneAPI Cluster runtimes with 4YSupp
7S090041WW	SBEL	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Small System support for oneAPI Cluster runtimes with 5YSupp
7S090042WW	SBEM	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Medium System support for oneAPI Cluster runtimes with 1YSupp
7S090043WW	SBEN	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Medium System support for oneAPI Cluster runtimes with 3YSupp
7S090044WW	SBEP	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Medium System support for oneAPI Cluster runtimes with 4YSupp
7S090045WW	SBEQ	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Medium System support for oneAPI Cluster runtimes with 5YSupp
7S090046WW	SBER	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Large System support for oneAPI Cluster runtimes with 1YSupp
7S090047WW	SBES	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Large System support for oneAPI Cluster runtimes with 3YSupp
7S090048WW	SBET	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Large System support for oneAPI Cluster runtimes with 4YSupp

Part number	Feature code	Description
7S090049WW	SBEU	Intel oneAPI Base & HPC Toolkit (Multi-Node) Academic Large System support for oneAPI Cluster runtimes with 5YSupp
7S09004AWW	SBEV	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 2 Concurrent User Academic 1YSupp with Intel HW
7S09004BWW	SBEW	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 2 Concurrent User Academic 3YSupp with Intel HW
7S09004CWW	SBEX	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 5 Concurrent User Academic 1YSupp with Intel HW
7S09004DWW	SBEY	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 5 Concurrent User Academic 3YSupp with Intel HW
7S09004EWW	SBEZ	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 10 Concurrent User Academic 1YSupp with Intel HW
7S09004FWW	SBF0	Intel oneAPI Base & HPC Toolkit (Multi-Node) - 10 Concurrent User Academic 3YSupp with Intel HW
7S09004GWW	SBF1	Intel oneAPI Base & HPC Toolkit (Multi-Node) - Enterprise-Above 10 Concurrent Users Academic

Seller training courses

The following sales training courses are offered for employees and partners (login required). Courses are listed in date order.

1. **VTT HPC: LiCO-Computing Orchestration for AI and HPC**
   2024-07-30 | 92 minutes | Employees Only

   NOTE: To download the attached PPT, Launch the course, exit the player to return to this screen, then scroll down to find the PPT to download.

   Please view this session as Ana Irimiea, AI Systems and Solutions Product Manager at ISG, speaks with us about LiCO version 7.2.1.

   She will talk about:

   -Overview of LiCO
   -Administrator and user capabilities
   -Deployment options
   -Ordering LiCO
   -Roadmap

   Tags: High-Performance Computing (HPC), Sales, Technical Sales

   Published: 2024-07-30
   Length: 92 minutes

   Start the training:
   Employee link: Grow@Lenovo

   Course code: DVHPC214

2. **Enterprise Deployment of AI and Phases of Model Development**
   2024-05-23 | 12 minutes | Employees and Partners

   Lenovo Senior AI Data Scientist Dr David Ellison whiteboards the concepts of using data from multiple sources to derive customer benefits through Artificial Intelligence and LiCO (Lenovo Intelligent Computing Orchestration) software.

   By the end of this training, you should be able to:

   •Describe enterprise deployment of Artificial Intelligence
   •Explain the process of model development
   •State the purpose of LiCO (Lenovo Intelligent Computing Orchestration) software
   •List three examples of Artificial Intelligence solutions

   Tags: Artificial Intelligence (AI), Data & Analytics, Technical Sales

   Published: 2024-05-23
   Length: 12 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: DAIS101
3. **Selling Lenovo Intelligent Computing Orchestration**
   2021-08-25 | 18 minutes | Employees and Partners

   The goal of this course is to help ISG and Business Partner sellers understand Lenovo Intelligent Computing Orchestration (LiCO) software. Learn when and how to propose LiCO in order to continue the conversation with the customer and making a sale.

   Tags: Artificial Intelligence (AI)

   Published: 2021-08-25
   Length: 18 minutes

   Start the training:
   Employee link: Grow@Lenovo
   Partner link: Lenovo Partner Learning

   Course code: DAIS202

Resources

For more information, see these resources:

- LiCO Product Guide:
  https://lenovopress.lenovo.com/lp0858-lenovo-intelligent-computing-orchestration-lico#product-families
- LiCO website:
  https://www.lenovo.com/us/en/data-center/software/lico/
- Lenovo DSCS configurator:
  https://dcsc.lenovo.com
- Optimizing Power and Energy in HPC data centers with Energy Aware Runtime
  https://lenovopress.lenovo.com/lp1646
- Energy Aware Runtime software and documentation:
  http://www.eas4dc.com
- Lenovo Compute Orchestration in HPC Data Centers with Slurm - Solution Brief:
  https://lenovopress.lenovo.com/lp1701-lenovo-compute-orchestration-in-hpc-data-centers-with-slurm

Related product families

Product families related to this document are the following:

- Artificial Intelligence
- High Performance Computing
- Supercomputing Servers

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION ”AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

This document, LP1651, was created or updated on April 2, 2024.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
  https://lenovopress.lenovo.com/LP1651
- Send your comments in an e-mail to:
  comments@lenovopress.com

This document is available online at https://lenovopress.lenovo.com/LP1651.

Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at https://www.lenovo.com/us/en/legal/copytrade/.

The following terms are trademarks of Lenovo in the United States, other countries, or both:
Lenovo®

The following terms are trademarks of other companies:

AMD is a trademark of Advanced Micro Devices, Inc.

Intel® is a trademark of Intel Corporation or its subsidiaries.

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

LSF® is a trademark of IBM in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.