



White Paper

intel
partner
Titanium

Center of Excellence
Hybrid Cloud , Cloud and On-Premise

Intel[®]'s Cloud Centre of Excellence Lab in partnership with SUSE

2023

The latest Intel® Xeon® processor capabilities give users the ability to run SUSE Rancher, Harvester HCI and Neuvector with scale and speed. This whitepaper details the opportunities and benefits of the Intel®-SUSE partnership.

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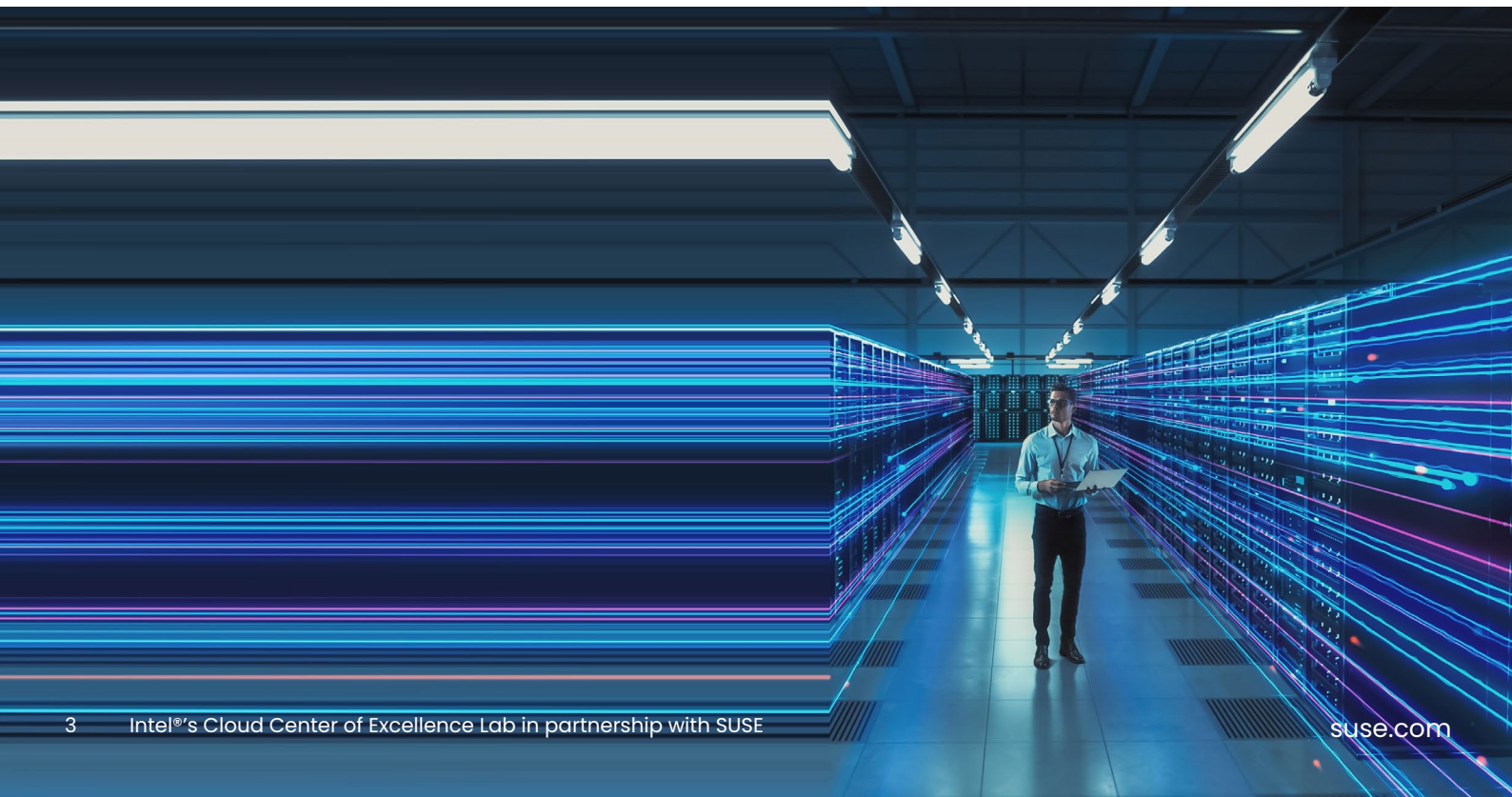
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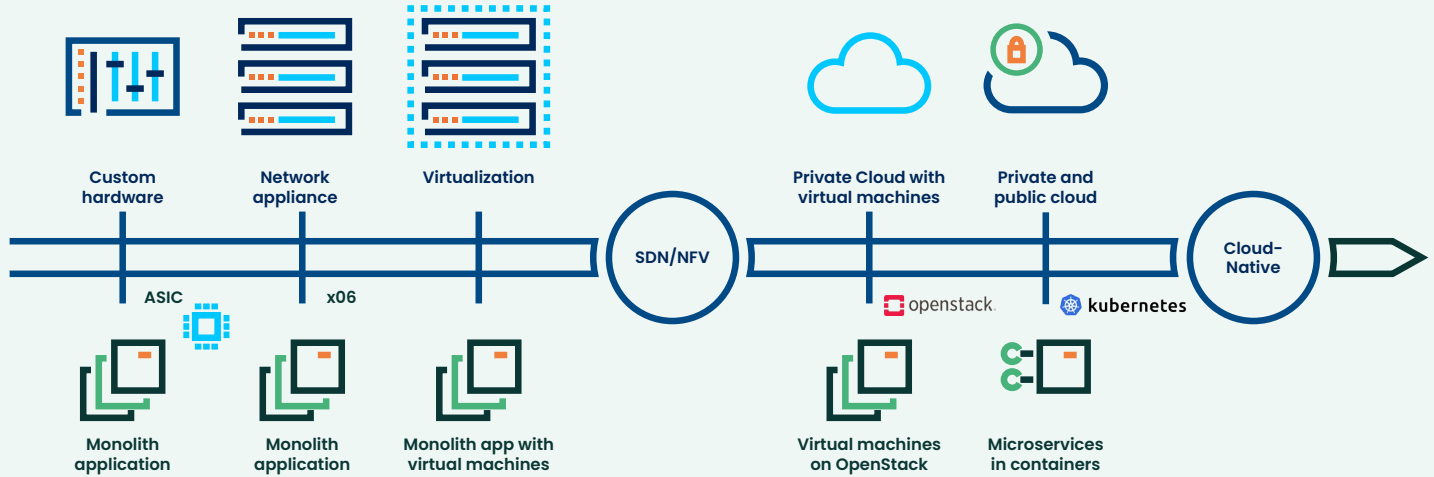
Welcome to the Intel®-SUSE Center of Excellence

Intel-SUSE Center of Excellence (COE) Lab 3.0 is state of the art technology with emerging cloud capability, offering customers the latest products and technological innovations from the Intel and SUSE partnership. As long-time partners in collaboration, Intel and SUSE now offer a COE, targeted to accelerate all industry verticals with reference architecture and performance benchmarking for digital transformation, application modernization and application migration. The COE is run in conjunction with OS3 Infotech for seamless system integration.

This whitepaper will take you through the current challenges faced by IT ops and DevOps teams, how the Intel-SUSE COE meets these challenges, and the unique benefits presented by the Intel-SUSE partnership.



The next step in digital transformation



Organizations are modernizing their infrastructure to power their digital transformation. As they move away from their legacy environments to hybrid, multi-cloud stacks, enterprises are creating new opportunities to unify their IT operations with containers and Kubernetes. Cloud native technologies are quickly becoming the preferred way for global organizations to build and modernize their applications and services at scale.

Relying on upstream Kubernetes isn't enough for teams deploying Kubernetes into production. Basic Kubernetes installations are plagued by a lack of central visibility, inconsistent security practices and complex management processes.

Therefore, Kubernetes management platforms need to confidently deliver:

- Simplified cluster operations: improved DevOps efficiencies with simplified cluster operations.
- Consistent security policy and user management: best-practice security policy enforcement and advanced user management on any infrastructure.
- Access to shared tools and services: which are easy use, consistent and with high reliability.

Intel-SUSE's Center of Excellence provides the combined expertise of Intel and SUSE to help customers and partners realize their goals for digital transformation.

What is the Intel-SUSE Center of Excellence?

The COE allows customers and partners to experience the latest Intel platform to trial their proof of concept (PoC) and validate performance to ensure it meets business requirements, covering cloud and on-premise.

Intel and SUSE invite customers and Global Systems Integrators (GSI's) across all technologies and verticals to run PoC through the Center of Excellence, investigating 'what if scenarios' to identify possible challenges and opportunities. Partners can use this foresight to reduce risk and accelerate the time to deliver their technology to customers. It is equipped with a 25 to 100 gigabyte high bandwidth network to test and qualify datacenter workloads, managing storage clusters with fast NVMe SSD for better input/output and performance.

The Lab offers partners reduced costs and improved performance by harnessing the power of the Intel platform combined with SUSE solutions. Using Intel® Xeon® scalable processors, the Lab can boost performance, speed and security, reducing both capital expenditure (CAPEX) and operational expenditure (OPEX). The Lab is designed and architected on 3rd Generation Intel Xeon (Intel Ice Lake) architecture as well as the newest 4th Generation Intel Xeon processor (Intel Sapphire Rapids) . This can accelerate

the latest SUSE solutions including SUSE Rancher (Kubernetes Management); SUSE Harvester (Hyperconverged Infrastructure); SUSE NeuVector (Zero Trust Container Security) as well as the SUSE Linux Enterprise product family, using features of AVX512, DL Boost, VNNI, SGX, Hyperthreading, Turbo boost and many other silicon capabilities.

SUSE Linux Enterprise Server (SLES) is SUSE's secure, adaptable and reliable open-source operating system that allows deployment of business critical workloads on-premise, in the cloud and at the edge. Through Intel's active contributions to open source projects and a commitment to an open ecosystem, Intel hardware is optimized to run high performance, demanding workloads with speed and reliability. The Intel-SUSE partnership allows customers and global integration partners to optimize from cloud to the edge with software that empowers the hardware.

How Intel and SUSE Work Together

Intel and SUSE’s collaboration closely mirrors the history of open-source computing during the last 30 years. From component enablement (processors, memory, networking, and storage connectivity) to working in key upstream projects like virtualization, EFI/UEFI, to cloud-native technologies, the partnership is dedicated to providing innovative solutions that meet the needs of our customers.

As the needs of our customers continue to evolve, so does the scope of our activities. Today’s partnership covers complete solutions around key sectors, such as high-performance and high-throughput computing, AI/ML, and edge computing (Telco, Industrial IoT). In this solution-first approach, the focus is demonstrating what’s possible with the right Intel-SUSE product combinations addressing important topics like secure device onboarding for edge devices, or simplifying the access to Intel technologies (network, GPUs, etc) and cloud-native applications.

Our strategic alliance delivers innovative hardware and software solutions.

1. **Infrastructure enablement:** SUSE was one of the earliest enablers of Intel® Optane™ for the Linux OS, and now works with Intel to ensure that the technology can be leveraged not only by SUSE Linux Enterprise Server, but by other offerings on SUSE’s portfolio.
2. **SAP leadership:** Both Intel and SUSE have significant strategic relationships with SAP. As SAP expands its solution ecosystem, both companies continue to collaborate to incorporate Intel’s latest silicon and software into the SUSE software-defined infrastructure (SDI) stack.
3. **Data-centric transformation:** SUSE and Intel help businesses better address the challenges of massive data increases with greater speed and agility. The combination of SUSE Linux Enterprise Server on Intel Optane DC persistent memory and latest generation Intel Xeon Scalable processors provide fast, innovative, and secure IT services and resilient enterprise S/4HANA platforms.

About SUSE

SUSE is a global leader in innovative, reliable, secure enterprise-grade open source solutions, relied upon by more than 60% of the Fortune 500 to power their mission-critical workloads such as SAP. We specialize in business-critical Linux, enterprise container management and edge solutions, and collaborate with partners and communities to empower our customers to innovate everywhere – from the data center, to the cloud, to the edge and beyond.

Intel Xeon Scalable Processors

4th Generation Intel Xeon Scalable processors and Intel Xeon CPU, feature the latest Intel® Accelerator Engines for AI, high performance computing (HPC), security, network, analytics and storage. Built-in acceleration is an alternative, more efficient way to achieve higher performance than growing the CPU core count. The latest

Intel Accelerator Engines, high bandwidth memory and software optimizations help improve performance and power efficiency across targeted workloads and can lead to cost savings through better CPU utilization.



CPU + Accelerators: Differentiated Performance On Real Workloads

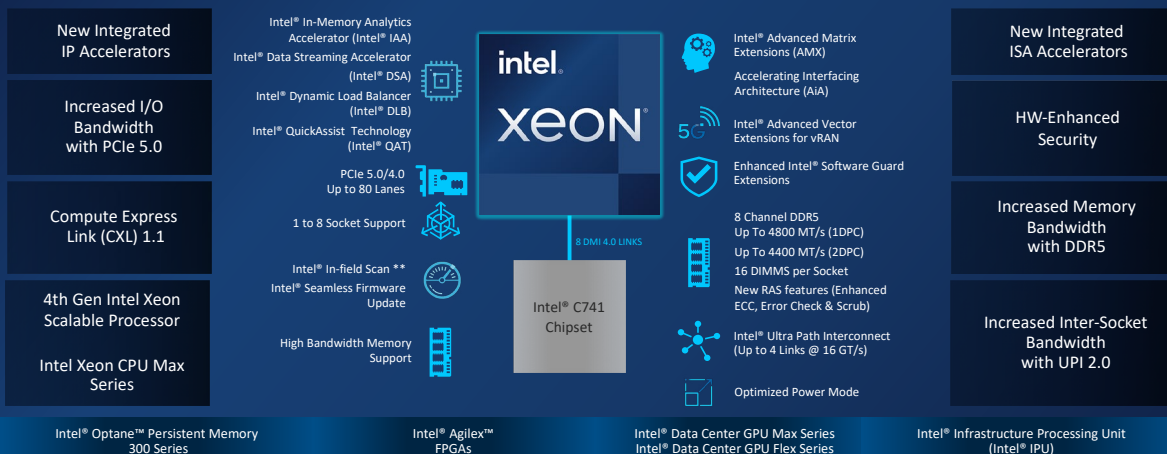
4th Gen Intel® Xeon® Scalable processors					Intel® Xeon® CPU Max Series
General Purpose Compute 53% average performance gain*	Artificial Intelligence Up to 10X higher inference and training performance*	Network 5G vRAN Up to 2X capacity for vRAN workloads at same power envelope*	Networking & Storage Up to 2X higher data compression with 95% fewer cores*	Data Analytics Up to 3X higher performance*	HPC Up to 3.7X on memory-bound workloads**

intel XEON Accelerate with Xeon

See backup for workloads and configurations. Results may vary.
 *4th Gen Intel Scalable Processor vs. 3rd Gen Intel Xeon Scalable processors
 ** Intel Xeon CPU Max Series vs. Intel Xeon E3800

Intel's Most Feature Rich Server Platform

4th Gen Intel® Xeon® Scalable Processors and Intel® Xeon® CPU Max Series Processors



intel XEON Accelerate with Xeon

* Enabled for WorkStation + vPro SKUs ONLY
 ** Intel In-Filled Scan is a new capability available through select providers in 2023

Intel Xeon Processors feature a range of advanced technologies:

- **Intel® On Demand Feature Activation**
- **Intel® QuickAssist Technology (QAT)**
- **Intel® Dynamic Load Balancer (DLB)**
- **Intel® Data Streaming Accelerator (DSA)**
- **Intel® In-memory Analytics Accelerator (IAA)**
- **Intel® Advanced Matrix Extensions (AMX)**
Intel® Advanced Matrix Extensions (Intel® AMX) is a new 64-bit programming paradigm consisting of two components: A set of 2-dimensional registers (tiles) representing sub-arrays from a larger 2-dimensional memory image An accelerator that is able to operate on tiles; the first implementation of this accelerator is called TMUL (tile matrix multiply unit).
- **Intel® Turbo Boost Technology**
Intel® Turbo Boost Technology dynamically increases the processor's frequency as needed by taking advantage of thermal and power headroom to give you a burst of speed when you need it, and increased energy efficiency when you don't.
- **Intel® Deep Learning Boost (Intel® DL Boost)**
A new set of embedded processor technologies designed to accelerate AI deep learning use cases. It extends Intel AVX-512 with a new Vector Neural Network Instruction (VNNI) that significantly increases deep learning inference performance over previous generations.
- **Intel® Resource Director Technology (Intel® RDT)**
Intel® RDT brings new levels of visibility and control over how shared resources such as last-level cache (LLC) and memory bandwidth are used by applications, virtual machines (VMs) and containers.

- **Intel® Hyper-Threading Technology**
Intel® Hyper-Threading Technology (Intel® HT Technology) delivers two processing threads per physical core. Highly threaded applications can get more work done in parallel, completing tasks sooner.
- **Instruction Set Extensions**
Intel® AMX, Intel® SSE4.2, Intel® AVX, Intel® AVX2, Intel® AVX-512
Instruction Set Extensions are additional instructions which can increase performance when the same operations are performed on multiple data objects. These can include SSE (Streaming SIMD Extensions) and AVX (Advanced Vector Extensions).

Security & Reliability

- **Intel® Crypto Acceleration**
Intel® Crypto Acceleration reduces the performance impact of pervasive encryption and increases the performance of encryption-intensive workloads including SSL web serving, 5G infrastructure, and VPN/firewalls.
- **Intel® Total Memory Encryption**
TME – Total Memory Encryption (TME) helps protect data against exposure via physical attack on memory, such as cold-boot attacks.
- **Intel® AES New Instructions**
Intel® AES New Instructions (Intel® AES-NI) are a set of instructions that enable fast and secure data encryption and decryption.
- **Intel® Software Guard Extensions (Intel® SGX)**
Intel® Software Guard Extensions (Intel® SGX) provide applications the ability to create hardware enforced trusted execution protection for their applications' sensitive routines and data. Intel® SGX provides developers a way to partition their code and data into CPU hardened trusted execution environments (TEE's).

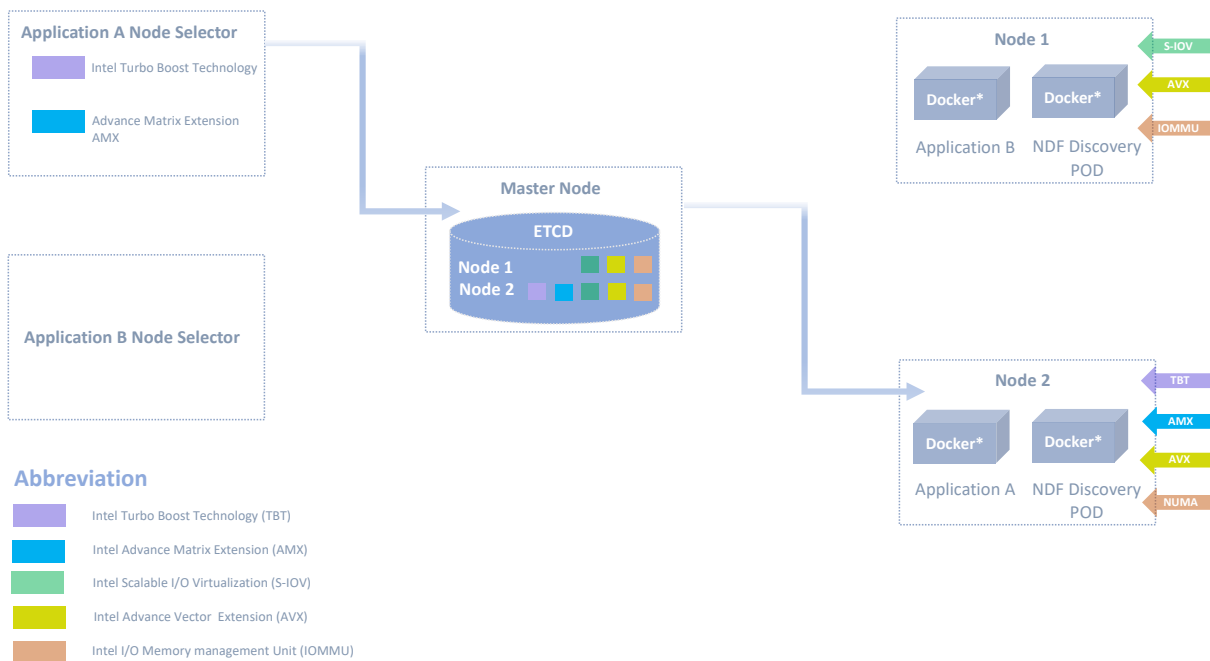
- Intel® Trusted Execution Technology**
 Intel® Trusted Execution Technology for safer computing is a versatile set of hardware extensions to Intel® processors and chipsets that enhance the digital office platform with security capabilities such as measured launch and protected execution. It enables an environment where applications can run within their own space, protected from all other software on the system.
- Intel® Run Sure Technology**
 Intel® Run Sure Technology, includes advanced RAS (reliability, availability and serviceability) features that deliver high reliability and platform resiliency, to maximize uptime of servers running mission-critical workloads.

Open source opportunities:

Intel’s commitment to supporting open source projects provides extensive CPU capability for workload scheduling including Kubernetes add-ons like node feature discovery which helps to detect and advertise hardware features available on each node of a Kubernetes cluster.

<https://www.intel.com/content/www/us/en/developer/articles/technical/node-feature-discovery.html>

Node Feature Discovery (NFD) in Kubernetes

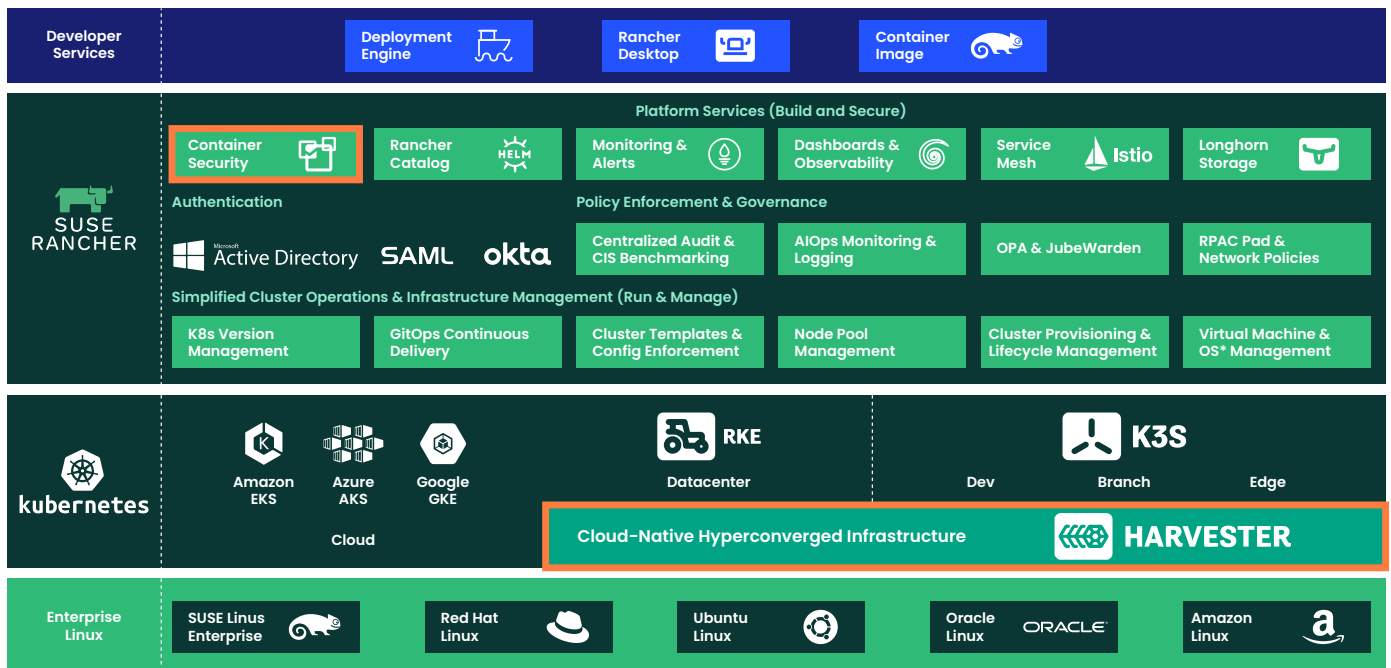


What Intel COE built on SUSE offers the customer

SUSE delivers a fully integrated cloud native solution. It simplifies infrastructure complexity by bridging the gap of classic and cloud native infrastructure. It unifies your existing virtualized infrastructure and accelerates the adoption of containers from core to

edge. This whitepaper will take you through the current challenges faced by IT ops and DevOps teams, how the Intel-SUSE COE meets these challenges, and the unique benefits presented by the Intel-SUSE partnership.

SUSE's enterprise container management stack



SUSE Rancher: Open source container management platform

SUSE Rancher addresses the needs of DevOps teams deploying applications with Kubernetes, and the needs of IT operations delivering enterprise-critical services.

- 1. Supports any certified Kubernetes distribution:** SUSE Rancher supports any CNCF-certified Kubernetes distribution. For on-premise workloads, we offer the RKE (Rancher Kubernetes Engine) that runs entirely within Docker containers. We support all the public cloud distributions, including EKS, AKS, and GKE. At the edge, we offer K3s.
- 2. Simplifies multi-cluster operations:** SUSE Rancher provides simple, consistent cluster operations, including provisioning, version management, visibility and diagnostics, monitoring and alerting, and centralized audit.

- 3. Unifies Security, Policy, and User**

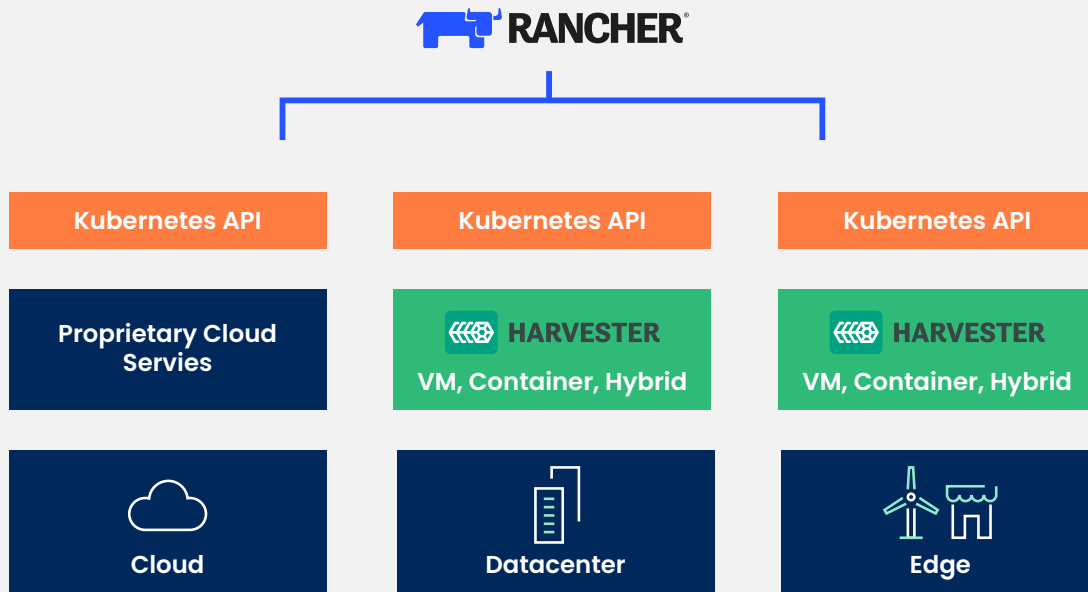
Management: SUSE Rancher lets you automate processes and applies a consistent set of user access and security policies for all your clusters, no matter where they're running.

- 4. Drives Adoption with Shared Tools**

& Services: SUSE Rancher provides a rich catalogue of services for building, deploying, and scaling containerized applications, including app packaging, CI/CD, logging, monitoring, and service mesh.

Rancher Prime is the enterprise-grade container management platform for organizations adopting Kubernetes. Owned and developed by SUSE, Rancher Prime addresses the operational and security challenges of managing multiple Kubernetes clusters while providing DevOps and IT Ops teams with integrated tools for running containerized workloads.

Helping organizations build a truly hybrid-IT strategy



SUSE Harvester – cloud-native hyperconverged infrastructure

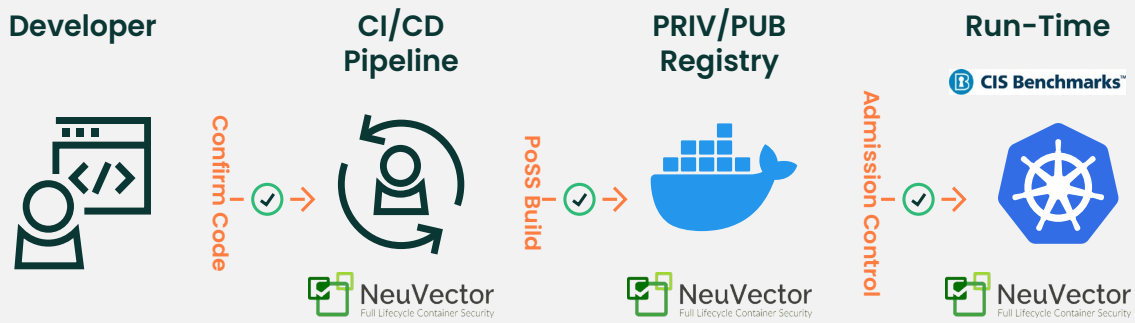
Hyperconverged infrastructure (HCI) doesn't need to be expensive or complex and with Harvester it's not. Harvester presents organizations with a modern HCI solution that is feature-full and purpose built for cloud-native environments. Consolidate virtual machine workloads and Kubernetes clusters with Harvester.

- 1. Next generation hyperconverged infrastructure solution:** Designed by the SUSE Rancher engineering team, Harvester is built on Kubernetes and utilizes the latest cloud-native solutions including Longhorn and KubeVirt. This enables organizations to futureproof and modernize their technology stack.
- 2. Simplify infrastructure complexity with cloud-native solutions:** Unify virtual

machines and container infrastructure operations with SUSE Rancher and Harvester. Easy to install from the SUSE Rancher console, Harvester uses the Kubernetes API as a unified automation language for both containers and virtual machine workloads. Providing operators with a cohesive platform to manage virtual machine and container workloads and a pathway to migrate from legacy stacks to modern cloud-native solutions.

- 3. Optimize resources and reduce infrastructure spend:** Harvester is feature-full and 100% open source. Built on the latest cloud-native technology, optimize the resourcing of stacks by attracting new or upskilling existing talent. Production-ready and free to use, Harvester enables organizations to save on licensing, legacy SAN and hardware costs common with conventional hyperconverged infrastructure solutions.

Vulnerability & Compliance Management



Runtime Security: Defense in Depth

Threat Based Controls

- CVEs
- DLP
- Network Attacks
- OWASP Top 10
- Admission Control

Zero-Trust Controls

- Automated Learning
- Network
- Network Process
- File Access
- Security Code

SUSE NeuVector: Full lifecycle container security

SUSE NeuVector is the only 100% open source, Zero Trust container security platform.

With NeuVector, customers can:

- continuously scan throughout the container lifecycle
- Remove security roadblocks
- Bake in security policies at the start to maximize developer agility.

1. **Kubernetes-native:** Experience end-to-end vulnerability management, automated CI/CD pipeline security, complete run-time security, and protection from zero days and insider threats.
2. **Zero Trust:** Our security-as-code model allows organizations to restrict access controls to networks, applications, and environments at the very start of the application process to optimize performance and user experience.

- 3. **100% open source:** Open sourced in January 2022, SUSE NeuVector ensures unrivalled codebase transparency for enterprises in highly regulated industries such as financial services, healthcare and government.
- 4. **Integrates with SUSE Rancher:** SUSE NeuVector can be used stand-alone with any leading container management platform. However, when combined with **SUSE Rancher**, users can adopt an aggressive, Zero Trust security posture for their entire Kubernetes environment with just a few clicks.

For customers running business critical workloads, the SUSE Linux Enterprise Server offers a high performance open source operating system including the leading platform for SAP solutions on Linux.

Customer use cases the COE Lab addresses

- **Building new cloud-native apps:** fast and scalable, mostly customer-facing to compete in the market
- **Modernizing and scale infrastructure efficiently:** where the cost of running applications is optimized, scalable, and resilient. This can include running new containerized apps alongside legacy, VM-based infrastructure.
- **Rearchitect or modernizing core business apps:** containers help to redesign traditional monolithic apps that have become too big or complex.
- **Distributed edge computing in manufacturing, retail, transportation, automotive, banking, etc:** Improved connectivity and device intelligence have expanded where complex applications can run, like elevators, wind turbines, drones, video surveillance cameras, cars, ships, trains and more.
- **AI, ML, and analytics on bare metal infrastructure, for greater performance, compared to virtual machines:** After years of heavy investment in data lakes, enterprises want to harness AI and ML to gather insights and predict rather than react to market inflections. Containers help run these algorithms more efficiently.



Summary

The Intel-SUSE Center of Excellence is a technical initiative program to reach customers through technology driven dialogue.

Intel in partnership with SUSE and OS3 Infotech, with joint GTM Strategy, invite partners to bring customers and prospects to the Lab and experience ready built-in solutions, presentations and live demo infrastructure and platform capabilities. Together, we offer customers a technical proposal and visibility of their investment, clarifying the performance requirements of infrastructure and ensuring overall stack requirements meets business need and delivery.

The Lab is powered with the latest Intel Xeon processors with Gold and Platinum SKU which provides the fastest compute you need to run real world workloads from bare metal to virtualization and containerization.

As part of the COE, additional capability like security with Intel SGX, high performance computing (HPC), and edge to cloud solutions are available. In addition, the Lab offers an open platform with Intel OneAPI development kit , including DPDK, SPDDK and SR-IOV / S-IOV and many other open source software offerings.

Why not differentiate your services as a SUSE and Intel partner? Arrange an appointment with the Intel-SUSE COE for your GSI customers via the contact details below:

Further references

- To access or request access to the COE please contact SUSE via email: [msp@suse.com](mailto:mSP@suse.com) or
- Tel: +91-22-61274180 or Toll free: 000 800 100 4462
- Find out how other organizations have worked with SUSE for organizational success [here](#)
- Digital services designed by police for police : [read the success story here](#)





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