Bull | VATES | intel®

Open and sovereign virtualisation for the modern data centre

An alliance for advanced sovereign virtualisation

Broadcom's acquisition of VMware has led to significant changes in the virtualisation market. VMware has shifted its portfolio further toward subscription-based licensing, including updated core-based minimum thresholds and revised renewal structures, which can make budgeting and long-term capacity planning more complex.

This white paper presents a sovereign, open alternative built in Europe: Vates VMS, the open-source virtualisation stack combining XCP-ng and Xen Orchestra, running on BullSequana SH and BullSequana SA enterprise servers and powered by Intel® Xeon® processors.

Users will get a Europe-aligned foundation (BullSequana SH is engineered and assembled in Europe, and Intel has manufacturing capacity in Ireland), performance at scale on a proven x86 platform, and a clear licensing model, as Vates' subscriptions are priced per host, not per core/CPU, helping restore cost predictability as you grow.

Bull

Bull: Europe's server manufacturer with end-to-end expertise

As one of the few **European server manufacturers**, Bull brings deep expertise across the full hardware lifecycle, from design and engineering to production and support. This capability is anchored in France, where Bull teams design and build servers from 2 to 16 sockets for secure, scalable, and sovereign infrastructure. Keeping this work in-house provides **full traceability**, supports **compliance with European standards**, and helps customers meet **strategic autonomy goals**.

VATES

Vates: open infrastructure made simple

Vates provides an open-source virtualisation ecosystem, delivering virtualisation and orchestration solutions that support **security, transparency**, and full **control** of data. Its Vates VMS stack, combining XCP-ng and Xen Orchestra, offers a cost-efficient, sovereign alternative to proprietary platforms and is trusted by organisations across Europe. By joining the Eclipse Foundation in 2025, Vates reinforced its commitment to **European digital sovereignty**, independence from U.S. tech giants, and open-source innovation.

intel.

Intel®: the silicon foundation for efficient virtualisation

Intel provides the **processor foundation** for modern enterprise virtualisation, combining **performance, security**, and standardisation. Intel Xeon processors support high VM density, efficient data movement, and strong workload isolation, enabling scalable and predictable data centres. This is reinforced by Intel's advanced semiconductor manufacturing presence in Leixlip, Ireland, helping ensure long-term platform continuity and supporting resilient, open sovereign infrastructures.

Together, Bull, Vates and Intel aim to provide organisations with a sovereign European infrastructure, spanning silicon, server platforms, and virtualisation software.

The evolution of virtualisation

Over the last two decades, virtualisation has transformed IT infrastructure, consolidating servers, improving utilisation, and enabling cloud operating models. However, several challenges now threaten the balance between efficiency, control, and sustainability:

- **VMware acquisition by Broadcom:** exposing locked-in customers to rising and unpredictable licensing costs.
- **European sovereignty requirements:** a virtualisation market dominated by non-European vendors (VMware/Broadcom, Red Hat), raising compliance, control, and auditability concerns.
- **Escalating costs and restrictive licensing:** proprietary hypervisors driving higher TCO through complex licensing models and increasing operational overhead.
- **Cloud-native and hybrid demands:** traditional stacks lacking agility for API driven, container-based environments.
- **Sustainability pressures:** rising energy costs and ESG objectives requiring more efficient IT operations.

The Vates open-source virtualisation management stack, combined with Bull enterprise servers powered by Intel Xeon processors, provides a relevant and balanced response to these challenges.

The role of modern CPU architectures in efficient virtualisation

At the foundation of any virtualised infrastructure lies the processor architecture. Modern CPU platforms play a decisive role in virtualisation efficiency, workload isolation, and long-term platform stability.

Intel Xeon processors serve as a widely adopted baseline platform for enterprise virtualisation, offering a balanced architecture optimised for consolidation, scalability, and predictable performance. This platform enables organisations to maximise infrastructure efficiency while maintaining strong isolation and control.

Built-in hardware capabilities contribute directly to virtualisation performance and efficiency by improving:

- **VM density:** advanced core designs, large memory capacity, and hardware virtualisation support enable higher virtual machine consolidation without compromising performance.
- **Data movement efficiency:** integrated acceleration and platform optimisations reduce CPU overhead for I/O, networking, and storage operations, critical in dense virtualised environments.
- **Resource isolation and control:** hardware assisted virtualisation and isolation mechanisms help ensure predictable workload behaviour and strong separation between virtual machines, supporting secure multi-tenant and private cloud deployments.

These capabilities allow virtualisation stacks such as Vates VMS to operate more efficiently, while reducing overhead and energy consumption at the infrastructure level.

Optimising costs through reference designs and open licensing

Cost efficiency starts with predictable, easy-to-manage infrastructure. Bull's validated reference designs significantly reduce integration complexity and ongoing maintenance overhead.

IDC reports that organisations using reference-architecture strategies can reduce **annual costs** by **nearly 25%** and shorten deployment timelines by a similar margin versus build-your-own approaches. IDC also notes that integrated infrastructure can drive larger gains—up to **55%** lower costs and **65%** faster deployment—improving time-to-value and simplifying operations.[1]

On the virtualisation layer, Vates strengthens cost control: compared with VMware's proprietary pricing, organisations typically see 60–80% lower licensing costs for standard clusters. In high-density environments, reductions can exceed 90%.

[1] DuBois, L., Perry, R., & Daly, J. (2013). Selecting the optimal path to private cloud for maximum ROI. IDC.

Licence comparison between Vates & VMware

Description	Vates vs VMware reduction per year %
Small Cluster 3 servers 1x16 cores	-63%
Medium cluster 5 servers 2x32 cores	-81%
Large cluster 16 servers 2x32 cores	-81%
High density cluster 8 servers 4x32 cores	-90%
Very High-density cluster 4 servers 8x64 cores	-98%

Vates' simple, predictable pricing, combined with BullSequana SH-based servers, creates significant opportunities for cost optimisation. Customers can either:

- reduce costs significantly compared with legacy virtualisation vendors; or
- keep the same budget and increase compute capacity by reinvesting virtualisation savings into hardware.

Secure, standardised infrastructure for agile virtualisation

Bull reference architectures

Bull, a leader in high-performance and enterprise computing, provides reference architectures designed to meet the most demanding virtualisation workloads, combining performance, scalability, and energy efficiency.

These reference architectures based on Bull servers and Vates virtualisation stack offer the following advantages:

1. Proven interoperability and reliability

- Reference architectures ensure validated compatibility between Bull hardware and the Vates virtualisation stack (XCP-ng + Xen Orchestra).
- Customers gain confidence that the solution is tested, stable, and supported end-to-end.
- This reduces integration risk and ensures predictable, reproducible performance across deployments.

2. Flexible, scalable infrastructure

- The solution can scale from small deployments to large data centres using consistent architectures.
- Modular reference designs allow customers to adapt capacity as their needs evolve.

3. Simplified deployment and faster time-to-value

- Bull's infrastructure industrialisation services offer flexible, factory-delivered options for hyperscalers, cloud providers, and large deployments.
- Services can include tailored, pre-integrated and pre-cabled systems that are fully tested and ready to deploy across compute, storage, networking, and operating systems.

4. Lower Total Cost of Ownership (TCO)

- Vates' open-source model avoids core- or socket-based licensing and provides predictable costs through a support subscription per physical host.
- Validated reference designs reduce integration and maintenance overhead, further optimising operational expenses.

5. European sovereignty and compliance

- Bull and Vates are European technology providers, supporting EU data protection, GDPR, and sovereignty requirements. This is especially valuable for public sector, defence, and critical infrastructure customers that need a secure, open, and auditable virtualisation solution.
- By centralising production at its Angers industrial site, Bull maintains end-to-end supply-chain control to support compliance with European regulations. This helps mitigate geopolitical and supply risks and supports system authenticity, integrity, and security from manufacturing through deployment.

6. Joint support and ecosystem Integration

- Customers benefit from coordinated support and lifecycle management from Bull, Vates and Intel.
- Integration with third-party backup, monitoring, and orchestration tools ensures ecosystem compatibility.

These features make Bull servers an ideal foundation for open virtualisation environments where performance, energy efficiency, and transparency are critical.

The Vates Virtualisation Platform

Together, Bull hardware and the Vates virtualisation stack form a European, sovereign alternative to VMware, Hyper-V, or proprietary KVM distributions.

The joint solution combines hardware reliability with open virtualisation in a coherent architecture, delivering a trusted platform for sovereign infrastructure.

Key Capability	Bull	Vates	Customer Benefit
Performance	• Optimised server design for virtualisation density	• Bare-metal compute virtualisation	• High VM-to-core ratio, low latency
Security	• Hardware root of trust, TPM 2.0	• Encrypted management and isolation	• End-to-end data protection
Sustainability	• Energy-aware design	• Efficient VM scheduling	• Lower power usage per workload
Scalability	• Modular, composable hardware	• Infrastructure execution and orchestration	• Easy expansion and automation
Sovereignty	• European engineering	• Open-source virtualisation	• Full control and auditability
TCO Reduction	• Optimised hardware utilisation	• No proprietary licensing	• 60–80% lower total cost of ownership

Intel confidential computing and secure silicon foundation

Intel provides the confidential computing and silicon security foundation of the reference architecture, enabling strong data protection, workload isolation, and trust in sovereign virtualised environments.

1. Confidentiality by design, from silicon to virtual machines

- Intel integrates hardware-based confidentiality and isolation mechanisms directly into the processor, ensuring that sensitive data remains protected even while in use.
- This silicon-level approach complements Bull's secure server platforms and the transparency of Vates' open-source virtualisation stack, forming a defence-in-depth security model suitable for regulated and business-critical environments.

2. European Union manufacturing footprint

- Intel's long-standing European manufacturing presence, with more than €30 billion invested in its Leixlip, Ireland campus since 1989, contributes to supply-chain resilience and technological continuity.
- Since the early 1990s, Intel Ireland has been behind numerous start-ups specialising in process technologies and has been home to the first 300mm wafer fab outside the United States.

3. Secure enclaves for sensitive workloads

- Intel Software Guard Extensions (SGX) enable secure enclaves that isolate sensitive code and data from the rest of the system, including the operating system and hypervisor.
- SGX is well suited to use cases that require strong confidentiality guarantees, such as cryptographic services, sensitive data processing, and regulated workloads where exposure must be minimised.

4. Confidential virtual machines

- Intel Trust Domain Extensions (TDX) extend confidential computing to virtualised environments by enabling confidential virtual machines.
- TDX helps protect virtual machines from access by the hypervisor or other privileged software, reinforcing tenant isolation and data confidentiality in shared or sovereign cloud infrastructures.
- This capability aligns naturally with Vates VMS and open virtualisation architectures, supporting secure multi-tenant deployments across private and sovereign clouds.

This industrial base reinforces the credibility of the Bull–Vates–Intel architecture as a durable and sovereign foundation for long-term infrastructure strategies.

Aerial photo of the Intel Leixlip campus in Ireland.

Spotlights on the reference architecture building-blocks

Bull and Vates jointly designed this new offering based on a converged infrastructure and Vates VMS software.

- High-performance
- Unique scalability
- Built-in security
- Efficient carbon footprint
- Quick to deploy
- Sovereignty
- Operation efficiency

The key components of the architecture are:

- BullSequana SH and SA servers powered by Intel Xeon.
- NetApp AFF A/C, FAS, EF series as shared storage.
- Juniper, Cisco or Brocade switches for their ethernet and SAN networks.
- Vates XCP-ng, as the virtualisation foundation.
- Vates XOA appliance to manage one or multiple pools.
- Vates XOA integrated backup solution, including XO-proxy to offload backups from VMs.

Tailored to each project, this architecture can be factory pre-integrated on demand.

Small size

	RU	
	42	**reserved**
	41	**reserved**
TOR	40	Network
	39	Network
OOB	38	MGT Network
	37	NET-ADMIN-CONSOLE
SAN	36	SAN - FC switch
	35	SAN - FC switch
	34	Reserved for future use
	33	
CMP	32	**2-socket Server SA/SH**
	31	
	30	**2-socket Server SA/SH**
	29	
	28	**2-socket Server SA/SH**
	27	
	26	Reserved for future use
	25	
	24	Reserved for future use
	23	
	22	Reserved for future use
	21	
	20	Reserved for future use
	19	
	18	Reserved for future use
	17	
	16	Reserved for future use
	15	
	14	Reserved for future use
	13	
	12	Reserved for future use
	11	
	10	Reserved for future use
	9	
	8	Reserved for future use
	7	
	6	Reserved for future use
	5	
Storage	4	NetApp AFF
	3	
	2	
	1	

Medium size

	RU	
	42	**reserved**
	41	**reserved**
TOR	40	Network
	39	Network
OOB	38	MGT Network
	37	NET-ADMIN-CONSOLE
SAN	36	SAN - FC switch
	35	SAN - FC switch
	34	Reserved for future use
	33	
CMP	32	**2-socket Server SA/SH**
	31	
	30	**2-socket Server SA/SH**
	29	
	28	**2-socket Server SA/SH**
	27	
	26	Reserved for future use
	25	
	24	Reserved for future use
	23	
	22	Reserved for future use
	21	
	20	Reserved for future use
	19	
	18	Reserved for future use
	17	
	16	Reserved for future use
	15	
	14	Reserved for future use
	13	
	12	Reserved for future use
	11	
	10	Reserved for future use
	9	
	8	Reserved for future use
	7	
	6	Reserved for future use
	5	
Storage	4	NetApp AFF
	3	
	2	
	1	

Large size

	RU	
	42	**reserved**
	41	**reserved**
TOR	40	Network
	39	Network
OOB	38	MGT Network
	37	NET-ADMIN-CONSOLE
SAN	36	SAN - FC switch
	35	SAN - FC switch
	34	Reserved for future use
	33	
CMP	32	**4-socket Server SH**
	31	
	30	
	29	
	28	**4-socket Server SH**
	27	
	26	
	25	
	24	**4-socket Server SH**
	23	
	22	
	21	
	20	Reserved for future use
	19	
	18	Reserved for future use
	17	
	16	Reserved for future use
	15	
	14	Reserved for future use
	13	
	12	Reserved for future use
	11	
	10	Reserved for future use
	9	
	8	Reserved for future use
	7	
	6	Reserved for future use
	5	
Storage	4	NetApp AFF
	3	
	2	
	1	

1. BullSequana SH, a powerful and scalable range of servers

BullSequana SH is a state-of-the-art x86 server line powered by Intel Xeon processors, designed to handle AI workloads and business-critical applications. Engineered and manufactured in Europe, it reflects Bull's commitment to digital sovereignty and strategic autonomy.

Its flexible architecture supports 4th and 5th Gen Intel Xeon and Intel Xeon 6 processors across **five complementary models**, scaling from **1 to 16 two-socket modules** via two interconnect options:

- A "glueless" interconnect for up to 4 modules, supporting up to 8 sockets with up to 4 Ultra Path Interconnect (UPI) links per CPU.
- Bull's eXternal Node Controller (XNC) technology for larger configurations, scaling from 8 to 16 sockets.

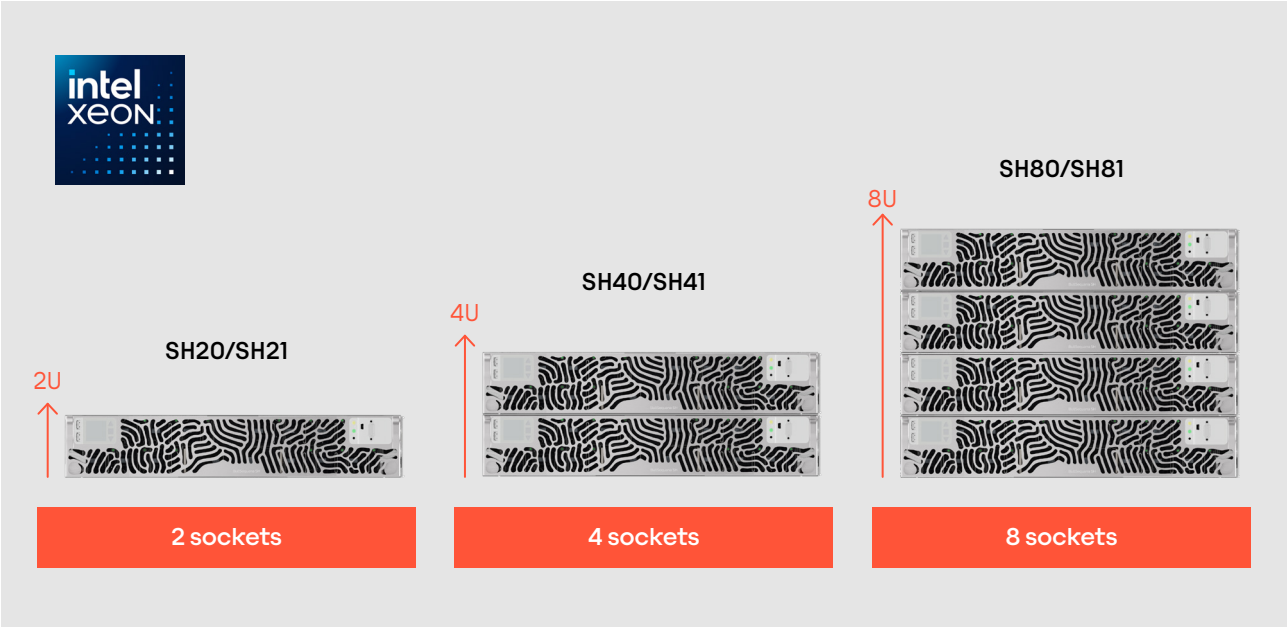
Thanks to its modular design, each model can be **upgraded to another** while preserving investments and application environments. Glueless configurations (2 to 8 sockets) can scale to 16 sockets by adding a UBox that embeds the required node controllers.

The two-socket server module is the building block of the BullSequana SH platform, packaged in a dense 2U form factor. Inter-module processor links are routed through the front and rear connection boxes and, for configurations above 8 sockets, via one UBox unit, eliminating the need for visible external cabling.

As part of the Bull–Vates joint offering, validated BullSequana SH configurations have been tested from 2 CPU systems up to 8 CPU sockets and up to 960 vCPUs, a scale that confirms the robustness and scalability of Vates VMS on our servers.

Intel Xeon processors bring built-in accelerator engines that enhance virtualisation efficiency, accelerate data movement, and optimise load balancing. They deliver exceptional performance for transactional workloads and large scale analytics while supporting consolidation and operational agility.

As a major x86 processor manufacturer, Intel enables server designs beyond two sockets, supporting very large systems with broad application compatibility. This makes it possible to extend consolidation benefits to large-scale environments, including hyperconverged and high-density virtualisation deployments.

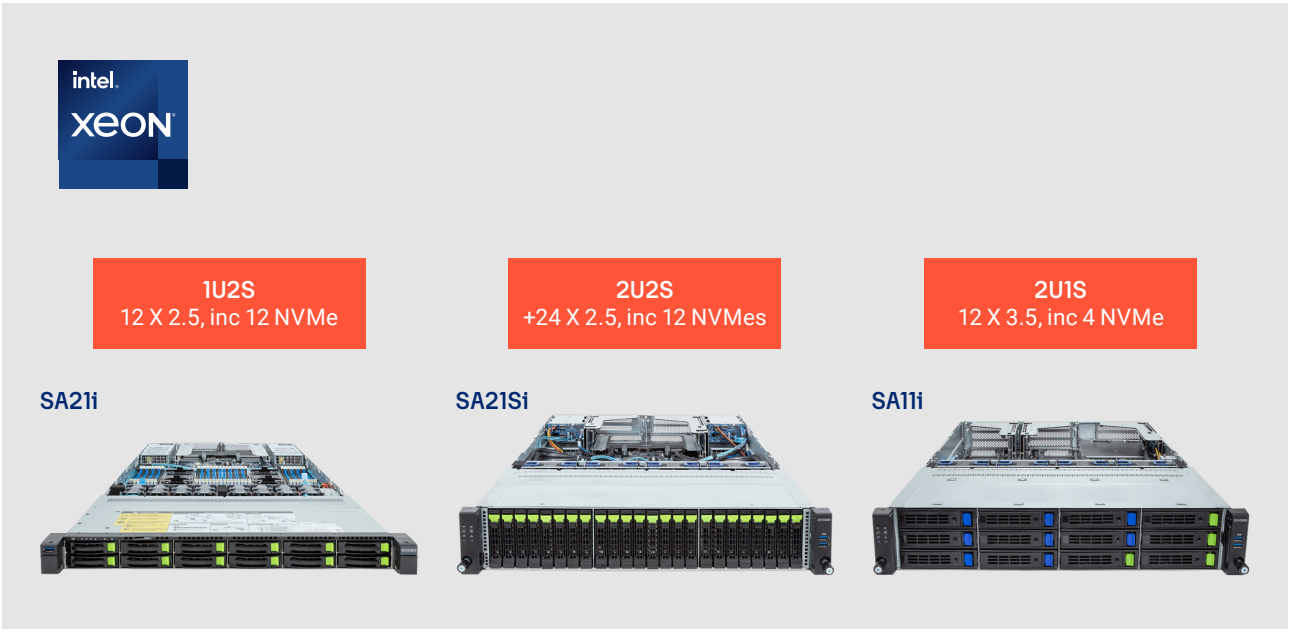


2. BullSequana SA, the choice for Agility

BullSequana SA family is a versatile range of **1 and 2-socket**, 1U or 2U, with up to 12 or 28 drives per enclosure, manufactured in France and powered by 4th and 5th Gen Intel Xeon.

The SA1 servers are well suited to virtualised workloads and modern architecture patterns, including private and hybrid clouds, containerised infrastructure, hyperconverged systems, and scale-out solutions.

A range of GPU options accelerates AI/ML, video processing, and image rendering workloads. BullSequana SA servers can be delivered as standalone units or fully rack-integrated systems with networking and storage, reducing integration effort and improving time-to-value.



3. Vates VMS

Vates VMS is a fully integrated virtualisation platform that combines the XCP-ng hypervisor with the Xen Orchestra appliance in a seamless, turnkey stack. Built for organisations that want enterprise-grade virtualisation without vendor lock-in, it offers a modern, sovereign, and cost-predictable alternative to proprietary solutions.

- Infrastructure abstraction and operational control to deploy and manage virtualised workloads across BullSequana platforms.
- A high-performance, production-ready hypervisor (XCP-ng).
- A powerful, web-based management interface (Xen Orchestra).
- Built-in backup, replication and disaster recovery.
- Centralised monitoring and alerting.
- Native support for clusters, pools, compute and/or storage live migration.
- A fully open-source, transparent architecture.

It's a platform designed for IT teams who want control, visibility, and long-term stability, without the complexity or unpredictable licensing of legacy vendors.

Vates VMS provides a complete ecosystem: hypervisor, management, monitoring, backup, automation, and orchestration, all engineered to work together out of the box.

Seamless migration from VMware to Vates

As organisations re-evaluate their virtualisation strategy amid rising VMware licensing costs and ecosystem uncertainty, Vates VMS offers a clear, stable, and future-proof path forward. The platform includes **built-in VMware migration tooling** that makes it easy to transition existing workloads with minimal disruption. Whether you're moving a handful of VMs or an entire data centre, Vates VMS streamlines the process with automated import workflows, compatibility checks, and optimised conversion pipelines. The result is a smooth, predictable migration experience that preserves performance, reduces operational risk, and frees your infrastructure from proprietary constraints, all while giving you full control over your virtualisation roadmap.

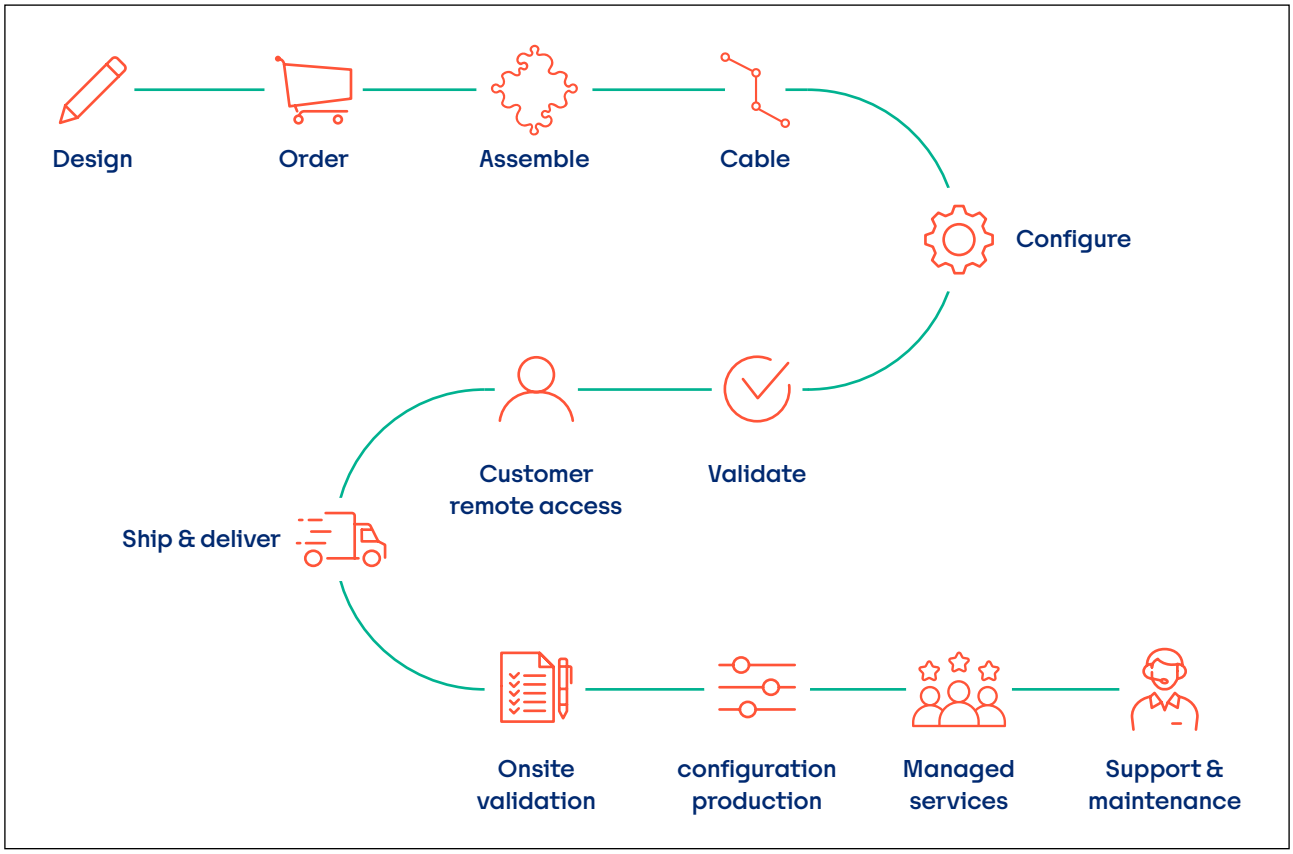
Not only an infrastructure

Bull goes far beyond delivering a performant virtualisation infrastructure, we provide **comprehensive, end-to-end support designed to secure, accelerate, and industrialise your digital transformation.**

Through our industrialisation services in our Angers factory, we deliver ready-to-use infrastructure that is pre-integrated, pre-cabled, fully tested, and tuned for rapid deployment. This reduces delivery risk, shortens timelines, and lowers costs.

Our multidisciplinary experts support you across the full project lifecycle, from design and integration to operations, ensuring performance, efficiency, and continuity of service.

Sustainability is embedded in our DNA, with architectures designed for energy efficiency and long-term resilience. And because sovereignty is central to our mission, as a European technology provider we help you retain control of your data and meet the highest regulatory standards.



Conclusion

Bull, Vates, and Intel together deliver a **trusted, efficient, sovereign virtualisation architecture** for the next decade of enterprise and public sector IT infrastructure.

By combining Bull's European-engineered server platforms, Vates' open enterprise-grade virtualisation stack, and Intel Xeon processors as the standardised silicon foundation, this reference architecture offers a secure, scalable, and future-proof alternative to proprietary virtualisation ecosystems.

Customers get the ease of use and rich feature set of Vates VMS, aligned with well-established virtualisation practices, while leveraging Bull's server portfolio, from scale-out 1- and 2-socket systems to highly consolidated platforms up to 8 sockets, powered by Intel Xeon processors optimised for performance, efficiency, and workload isolation.

This open solution enables organisations to **consolidate workloads, reduce operational and licensing costs**, and **retain full control over their environments**, without compromising **performance, security,** or **transparency**. Intel's long-term platform stability, built-in accelerators, and confidential computing capabilities further strengthen the foundation for predictable and secure virtualised operations.

Time-to-value is accelerated through predefined reference architectures and Bull's ability to deliver fully integrated, factory-built racks, with all components assembled, cabled, tested, and preloaded with software, reducing deployment risk and operational complexity.

Together, Bull hardware, Vates virtualisation, and Intel Xeon processors enable open, secure, and sustainable virtualised data centres, designed for sovereignty, resilience, and long-term confidence.

Learn more at

www.bull.com

www.vates.tech

www.intel.com

Notices & Disclaimers

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Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details.

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