

Avanti Virtual Alpha Software Product Description

for the Avanti Virtual Alpha suite

Version 5.1.0



Migration Specialties Europe

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Avanti Virtual Alpha Software Product Description

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1 Introduction

Avanti Virtual Alpha, shortened to Avanti in this document, is a virtual AlphaServer 400 designed to be hosted on Windows x64 systems. It is the complete current product, including configurations previously known as FreeAXP or AvantiFlex.

Avanti offers the following key features:

- OpenVMS, Digital UNIX, and Tru64 UNIX support
- Simple configuration
- Flexible pricing
- Optional commercial licensing and separately available support
- Multiple instances on a single host
- VM host support
- Zero-unit configurations that require no license key

Avanti is designed to virtualize legacy Digital Equipment Corporation (DEC), Compaq, and HP Alpha hardware. The product is binary compatible with real Alpha hardware, allowing the resident operating system and software to be ported to Avanti without modification or the need for source code. Avanti offers a simple way to upgrade existing Alpha systems to new, commodity hardware.

Avanti is intended to virtualize legacy production and non-production workloads. It is not designed, tested, or certified as a safety-critical or fail-safe component; use in such a role requires the separate signed written agreement described in the applicable EULA. This does not prohibit use in a safety-sensitive environment when Avanti is not relied upon to perform a safety-critical or fail-safe function. It is capable of providing on par performance with first generation personal and work group class Alpha systems when hosted on appropriate hardware. It can serve as a replacement for any Alpha system where performance is not a key criterion.

Each Avanti instance supports configuring 32MB to 3GB of main memory regardless of the guest operating system; Digital UNIX and Tru64 UNIX can use up to 1GB. Each instance also supports up to 45 disk, tape, or CD-ROM storage devices, including physical CD/DVD-ROMs, up to three 100Mb NICs, one virtual or physical serial console, and up to 26 virtual or physical serial ports.

The two onboard serial UARTs remain present to guest firmware when a host-side serial connection is not configured. An unconnected port is idle and provides no host Telnet or physical COM connection.

A zero-unit Avanti configuration requires no license key and includes 32MB to 128MB of virtual memory, one KZPAA controller with up to seven targets or one KZPCA controller with up to fifteen targets, one physical CD/DVD-ROM, up to two 100Mb NICs, one virtual serial console, and one virtual serial port. It is provided without warranty or manufacturer support. Annual paid support is available separately for both zero-unit and licensed configurations.

2 Host Server Requirements

Avanti 5.1.0 requires a single active Windows processor group. Each instance must have an allowed CPU for its dedicated Alpha-emulation thread and at least one remaining allowed CPU for I/O; the I/O CPUs may be shared between instances. Avanti respects Windows process/job affinity and configured CPU exclusions rather than widening those restrictions. New admission must preserve eligible I/O capacity for every existing instance. Failed CPU discovery or affinity assignment is reported as an error. See the manual for restrictions, rollback and restart guidance; these requirements do not change license-unit charges.

On hybrid hosts, the per-emulator `cpu_core_preference` setting accepts automatic, performance, or efficiency. Automatic and performance prefer the highest available Windows efficiency class when Avanti selects the Alpha-CPU thread's logical processor; efficiency prefers the lowest. Selection falls back when the requested class is unavailable, and supported Windows hosts without efficiency-class data retain physical-core and topology ranking. This is a placement hint within the existing Windows and configured CPU boundaries; it does not provide exclusive hardware ownership or guarantee performance, power use, or energy savings.

2.1 Single Avanti Instance

These are minimum recommended host system requirements. Faster hardware will provide better performance. Use quality hardware to ensure long term reliability. When running multiple instances of Avanti on a single host system, an additional CPU core is required for each Avanti instance.

- 64-bit Windows host: Windows 8 or later, or Windows Server 2012 or later
- Dual core processor, 3GHz or faster recommended
- Memory: 8GB
- 2 NICs
- Sufficient disk space to support virtual disk image files.

2.2 Multiple Virtual Alpha Instances

Multiple Avanti instances can run on a single host server simultaneously, and no separate base license charge applies to an additional instance. An additional host-server CPU core is required for each additional virtual Alpha. Each instance uses its own configuration file; optional-feature units used by concurrently running instances are drawn cumulatively from the installed host-wide pool.

Each file must contain only one emulated Alpha; multi-system files are rejected. Migrate an old combined file into separate configurations, preserving required session definitions and checking file paths and host ports. Internal networks are process-local, so copying a shared internal network does not connect separate processes. Use an appropriate common external Ethernet connection, check unique guest MAC and network addresses, preserve required isolation, and verify peer communication; see the manual's multiple-instance migration guidance.

Running multiple virtual Alpha systems requires robust host hardware. Sufficient CPUs, additional memory, and a fast I/O bus will be required to achieve adequate performance. The following table provides minimum host system configuration guidelines.

CPU	3/2: 3 host CPU cores per 2 Alpha instances
Memory	8GB for Windows + 2GB for JIT + 2 * Alpha Memory
Disk	• One disk dedicated to Host O/S. • At least one disk per Alpha instance. RAID arrays provide performance and redundancy advantages and are recommended.



3 Avanti Software Package

The Avanti software package, User Guide, and Release Notes can be downloaded from the [Migration Specialties Europe website](#). The kit includes the Avanti emulator, configuration utility, NDIS network driver, and PuTTY terminal emulator.

Avanti license units can be ordered from Migration Specialties Europe by contacting the company (sales@migrationspecialties.nl).

4 Virtual Hardware

4.1 Summary

4.1.1 Avanti

CPU	1 CPU supporting EV4, EV5, and EV6 instruction sets
Memory	32MB - 3GB configurable; Digital UNIX and Tru64 UNIX can use up to 1GB
Disk Controllers	1 - 3*
Disks per Controller	7 (KZPAA) or 15 (KZPCA)
Maximum Disk Size	2TB (limit determined by guest operating system)
Tape	DEC DLT2000
NICs	1 - 3*
Serial Ports	2 virtual and/or physical
5-Port Serial Card	Up to 5 cards supporting virtual and/or physical serial connections (OpenVMS only)
CD-ROM	45**
PCI slots	4*

* Avanti accepts one NIC or SCSI controller in each of pci6, pci11, pci12 and pci13, with at most three NICs and at most three SCSI controllers and a combined maximum of four cards. Empty slots are allowed; DE435 and DE500 cards share the NIC limit. ISA serial-card positions isa2, isa3 and isa4 conflict with pci13, pci12 and pci11 respectively. Malformed, unsupported or duplicate PCI identifiers, per-type excesses and these ISA/PCI conflicts are rejected before device initialization. Correct older hand-edited configurations using the manual's PCI-slot migration guidance. These checks do not change unit charges or guest-version requirements.

** In theory, each disk on each controller could be a virtual or physical CD/DVD-ROM drive. There is a maximum of 45 SCSI drives. 

Five-port ISA serial cards are supported only under OpenVMS. Each of isa0 through isa4 may contain one each of serial0 through serial4; duplicate numeric positions, malformed names and higher positions are rejected. Each card requires 10 units, including virtual or physical connections on its ports. Five cards require pci11 through pci13 to be unused; four cards at isa0 through isa3 may coexist with a NIC at pci6 and SCSI at pci11. Normally omit iobase and irq for name-derived, non-overlapping allocation. Compatibility overrides must provide an aligned, non-overlapping 48-byte I/O range and a distinct IRQ, avoiding other cards and both onboard base UARTs even when their host connections are not configured; IRQ 2 is reserved and zero requests automatic assignment. See the manual's five-port serial-card section for defaults, override limits and migration of configurations rejected by these checks.

4.1.2 Included Zero-Unit Configuration

CPU	1 CPU supporting the EV4, EV5, and EV6 instruction sets
Memory	32MB – 128MB
Disk Controllers	1 KZPAA or KZPCA
Disks per Controller	7 - 15
Maximum Disk Size	2TB (limit determined by guest operating system)
NICs	1 - 2*
Serial Ports	2 virtual
CD-ROM Support	1
PCI slots	3*

*A zero-unit Avanti configuration allows up to three virtual PCI devices. Each PCI slot can contain either a NIC or a disk controller; the configuration can contain one or two NICs and one disk controller.

4.2 License Units

Avanti can run without a license key when the selected configuration requires zero units. Configurations that require additional resources use a key containing the quoted unit count. A key may contain any positive unit count supported by the license format; no fixed purchase or key increment and no fixed full-product package apply. Existing keys remain valid.

License-key validity is checked at emulator startup. Each new paid start must fit within the currently installed key's host-wide capacity after accounting for all running claims. Replacement keys do not combine capacities; a lower capacity, key removal, or expiry does not interrupt an already running instance. Zero-unit starts do not require a key or change paid capacity.

The following table outlines the units required for individual Avanti components.

Avanti Component	Required License Units
512MB Memory	10
Additional Narrow SCSI Controller (7 targets)	10
Additional Wide SCSI Controller (15 targets)	10
Virtual Tape Device	10
NIC	5
2 x Physical Serial Ports	10
5-port Serial Card	10
Print to File Session	10

Enhanced Performance (JIT)	60
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License unit pricing is covered in the Migration Specialties Virtual Alpha Pricing Guide, available on the Migration Specialties web site.

4.2.1 License Unit Utilization

For example, adding 5 license units to the included zero-unit resources enables either a third NIC or one physical serial port.

Adding 10 license units enables any one of the following additions:

- Avanti configured with 512MB of memory.
- Avanti configured with two SCSI controllers.
- Avanti configured with a virtual tape device.
- Avanti configured with two physical serial ports.

4.3 CPU

Avanti provides a single virtual Alpha CPU. The Avanti CPU includes support for the EV4, EV5 and EV6 Alpha processor instruction sets. Symmetric Multiprocessing (SMP) is not supported.

The host logical processor used for the virtual CPU is selected with topology-aware affinity. A configurable hybrid-core class preference can influence that selection, with fallback, but does not reserve a physical core or guarantee a performance or power result.

4.4 Memory

Avanti supports configuring 32MB to 3GB of main memory, regardless of the guest operating system. Digital UNIX and Tru64 UNIX can use up to 1GB; this guest-operating-system limit does not reduce the emulator's 3GB configuration capacity. Configure memory appropriate to the guest rather than assuming it can use every configured byte. A real AlphaServer 400/166 supported a maximum of 384MB of memory.

A zero-unit Avanti configuration includes up to 128MB of memory. Larger selections are licensed in 512MB bands: 10 units permit up to 512MB, 20 units permit up to 1GB, and so on, to the emulator limit. The included 128MB does not accumulate with a licensed 512MB band.

4.5 Storage

4.5.1 Controllers

Avanti supports up to three KZPAA narrow and/or KZPCA wide SCSI controllers. Controller availability depends on the installed guest release. The supported KZPCA matrix starts at OpenVMS V7.1-2 and Digital UNIX/Tru64 UNIX V4.0F. V4.0E has not been qualified for KZPCA; use KZPAA with earlier or unqualified guest releases.

The first KZPAA or KZPCA SCSI controller is included in a zero-unit configuration. Each additional controller requires 10 license units, up to the maximum supported by Avanti.

Each controller exposes bus 0. Use one device per target: 0 through 6 for KZPAA, or 0 through 6 and 8 through 15 for KZPCA; ID 7 is reserved. File-backed disks, RAM disks, CD/DVD-ROMs, tape images, and raw devices all occupy targets. Hand-edited disk<bus>.<target> names must contain complete unsigned decimal numbers. Invalid or duplicate addresses are rejected before device initialization; correct them using the manual's SCSI configuration guidance. Device-specific license rules and guest-version restrictions are unchanged.

4.5.2 KZPAA SCSI Controller

The virtual KZPAA supports up to 7 virtual disks, CD/DVD-ROMs, or virtual tapes.

4.5.3 KZPCA SCSI Controller

The virtual KZPCA supports up to 15 virtual disks, CD/DVD-ROMs, or virtual tapes.

4.5.4 Internal Storage

Virtual disk, CD-ROM, DVD-ROM, and tape drives are supported as image files under the host operating system. File location is limited only by the host system. Each virtual-tape SCSI READ or WRITE command is limited to 16 MiB, each WRITE FILEMARKS command to 1,024 marks, and each virtual-disk READ or WRITE command to 64 MiB; these limits do not restrict total image-file sizes.

4.5.5 Disks

Maximum usable disk size is limited by the guest operating system, file system, and device driver. Avanti does not impose a separate 9GB limit on image-backed virtual disks. OpenVMS V6.2 has been validated by initializing, mounting, writing, and reading a 12GiB virtual disk under Avanti. OpenVMS V6.0 through V8.3 use a 1TB guest block-addressing limit, subject to the system-disk, cluster-size, and application caveats documented for the applicable OpenVMS release. Image-backed and host physical disks are both presented to the guest as SCSI block devices; the host path to a physical disk can impose additional limits.

Avanti also supports RAM disks backed by an existing, nonempty image whose size is an exact multiple of 512 bytes. A RAM disk occupies one SCSI target but carries no per-device license-unit charge. It is suitable for disposable data such as swap or pagefiles, not as a substitute for durable storage.

Avanti must read the complete image before startup succeeds. With write-back enabled, the complete in-memory image is rewritten during graceful shutdown; an abnormal termination can lose unwritten changes. With write-back disabled, runtime changes are not persisted. Incomplete loads and failed or short write-back operations are reported.

4.5.6 CD and DVD-ROM

Avanti supports physical CD and DVD-ROM devices; the first is included in a zero-unit configuration. CDs and DVDs can also be copied as ISO files and accessed as virtual media. Avanti does not support CD/DVD-ROM burning.

4.5.7 External Expansion

Virtual disk, CD-ROM, DVD-ROM, and tape drives can be created on external storage devices accessible to the host system.

4.6 Console

Avanti provides SRM console access via a serial port (OPA0/tty00). The console can use an included virtual port or a licensed physical port.

4.7 Communications

- Avanti allows up to three virtual NICs. A DE435 operates at 10 Mb/s; a DE500 operates at 10 or 100 Mb/s. The first two NICs are included in a zero-unit configuration; the third requires 5 units. Host-side packet transfer performance is driven by the host system and may exceed 100 Mb/s.
- Avanti allows one virtual or physical serial console (OPA0/tty00). A virtual console is included; assigning a physical port requires license units.
- Avanti allows one virtual or physical serial port (TTA0 or /dev/tty01). A virtual port is included; assigning a physical port requires license units.
- Avanti allows up to five virtual 5-port ISA serial cards (OpenVMS only). Each card requires 10 units.

Virtual serial port access is by telnet via a user defined telnet port. Physical serial port access is supported via a physical serial (COM) port on the host system. In hand-edited configuration files, the two base ports are the unique `serial0` and `serial1` components; malformed, duplicate, or out-of-range base-port identifiers are rejected before startup.

4.8 Printers

- Network printer support is dependent upon the O/S running on Avanti.
- Serial printer support is available via TTA0/tty01, virtual 5-port ISA serial cards, host-system serial ports, or a print-to-file session. Physical, ISA-card, and print-to-file options require the applicable license units.
- Print to File captures serial-port output as host text files and supports rule-based filenames. Each configured Print to File session requires 10 license units.

5 Configuration



Avanti is configured via a simple Windows GUI interface.

Auto-Idle is an optional feature, disabled by default, that reduces host CPU use while the guest operating system is idle. It can reduce performance for I/O-intensive workloads and should be disabled when maximum performance is required.

Auto-Exit is a separate optional feature that closes Avanti after a normal OpenVMS or Tru64 UNIX shutdown instead of leaving the emulator at the SRM firmware prompt.

6 Software

6.1 Operating Systems

- OpenVMS V6.1-1H1 and higher.
- Digital UNIX V3.2C and higher, including later releases named Tru64 UNIX.

Avanti implements the AlphaServer 400 SRM environment and a virtual serial console, but not an AlphaBIOS environment or a graphics adapter. Windows NT and operating systems that require a graphical console are therefore not supported. Other SRM-capable operating systems, including Linux, NetBSD, FreeBSD, and OpenBSD, are outside the supported matrix. The listed version floors do not imply that every installation kit, virtual-device combination, or field-test release has been qualified with every Avanti release.

6.2 Terminal Emulator

PuTTY: Free implementation of Telnet and SSH for Windows and UNIX platforms. A copy of PuTTY is provided with Avanti. The software is also available from this link:

<https://putty.software/>

6.3 Tested O/S

Avanti supports 64-bit (x64) Windows hosts, with Windows 8 x64 and Windows Server 2012 x64 as the minimum client and server baselines. The following table distinguishes the exact host evidence retained by the project from legacy family-level reports.

Host family	Retained evidence	Scope
Windows 10	Legacy family report; exact edition and build evidence was not retained.	Historical report only; not 5.1.0 release-package validation.
Windows 11	Windows 11 Pro 64-bit, version 10.0.26200, tested 18 September 2026.	Licensed lifecycle and core-affinity suite only; not complete 5.1.0 release-package validation.
Windows Server 2012 / 2012 R2	Legacy family report; exact edition and build evidence was not retained.	Historical report only; not 5.1.0 release-package validation.
Windows Server 2016	Legacy family report; exact edition and build evidence was not retained.	Historical report only; not 5.1.0 release-package validation.
Windows Server 2019	Legacy family report; exact edition and build evidence was not retained.	Historical report only; not 5.1.0 release-package validation.
Windows Server 2022	Legacy family report; exact edition and build evidence was not retained.	Historical report only; not 5.1.0 release-package validation.

	not retained.	
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Inclusion is not 5.1.0 recertification or a blanket guarantee for every edition, build, or driver. Complete package compatibility must be established separately for each release.

7 Support

7.1 Warranty

A zero-unit Avanti configuration is provided without warranty. A paid license carries only the 30-day limited warranty against defects stated in the applicable EULA; that warranty is not a support entitlement.

Neither zero-unit operation nor a paid license includes manufacturer support. Annual paid support can be purchased separately for either.

7.2 Unsupported Options

Avanti has not implemented the EV4 CPU on-chip performance counters. Code profiling applications such as kprofile and uprofile will not work correctly on Avanti.

7.3 Support

Avanti customers holding a valid support contract may contact their Avanti supplier with questions and problem reports. The limited warranty against defects does not include technical support; warranty claims must follow the notice procedure in the applicable EULA.

For community assistance, visit VSI's [Hardware Emulators forum](#).

7.4 Updates

Migration Specialties Europe may post updates to Avanti at any time. Notices of updates will be posted to Avanti customers, Avanti suppliers, and on the Migration Specialties Europe web site.