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Enhanced VMotion Compatibility (EVC) processor support



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Details

Enhanced VMotion Compatibility (EVC) simplifies VMotion compatibility issues across CPU generations. EVC automatically configures server CPUs with Intel FlexMigration or AMD-V Extended Migration technologies to be compatible with older servers.

After EVC is enabled for a cluster in the VirtualCenter inventory, all hosts in that cluster are configured to present identical CPU features and ensure CPU compatibility for VMotion. The features presented by each host are determined by selecting a predefined EVC baseline. VirtualCenter does not permit the addition of hosts that cannot be automatically configured to be compatible with the EVC baseline.

Solution

To use EVC, you must be running ESX 3.5 Update 2 or higher with VirtualCenter 2.5 Update 2 or higher and have compatible processors in your servers. EVC does not allow for migration with VMotion between Intel and AMD processors.

Note: To search for supported EVC CPU types, see the charts below or refer to the [WebHCL](#) and search by EVC Modes.

Note the following restrictions:

1. VMware cannot verify whether all processor models listed are capable of EVC support. For more information on supported servers and processors models, see the [Systems Compatibility Guide](#) for your ESX version.
2. Verify the BIOS settings for these processors enable Hardware Virtualization (if available) and Execute Protection. Default BIOS settings may not always enable these features. Hardware Virtualization is Intel VT on Intel processors and AMD-V on (supported) AMD processors. Execute Protection is Intel eXecute Disable (XD) on Intel processors and AMD No eXecute (NX) on AMD processors. Until these CPU features are enabled, ESX hosts with EVC supported CPU types listed below will be unsupported. EVC capabilities of your server are based on two factors:

1. The version of vCenter Server that manages the host.
2. The underlying CPU architecture of the host processor.

Tables 1.1 and 1.2 lists the available EVC baselines their description.

Table 2 describes EVC baselines supported by different vCenter Server versions.

Tables 3.1 and 3.2 describe EVC baselines supported by different CPU architectures.

This section contains the following subjects:

- Table 1.1: **Description of Intel EVC Baselines**
- Table 1.2: **Description of AMD EVC Baselines**
- Table 2: **EVC Baselines supported in ESX releases**
- Table 3.1: **EVC Baselines on Intel CPUs**
- Table 3.2: **EVC Baselines on AMD CPUs**
- References

Table 1.1: Description of Intel EVC Baselines

EVC Baseline	Description
Intel® Xeon® Core™ 2	Applies baseline feature set of Intel® Xeon® Core™2 (<i>Merom</i>) processors to all hosts in the cluster.
Intel® Xeon® 45nm Core™ 2	Applies baseline feature set of Intel® Xeon® 45nm Core™2 (<i>Penryn</i>) processors to all hosts in the cluster. Compared to the Intel® Xeon® Core™2 EVC mode, this EVC mode exposes additional CPU features including SSE4.1
Intel® Xeon® Core™ i7	Applies baseline feature set of Intel® Xeon® Core™i7 (<i>Nehalem</i>) processors to all hosts in the cluster. Compared to the Intel® Xeon® 45nm Core™2 EVC mode, this EVC mode exposes additional CPU features including SSE4.2 and POPCOUNT
Intel® Xeon®	Applies baseline feature set of Intel® Xeon® 32nm Core™i7 (<i>Westmere</i>) processors to all hosts in the cluster. Compared to the Intel® Xeon® Core™i7 mode, this EVC mode exposes additional CPU features including AES and PCLMULQDQ.

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 VMware ESXi 4.0.x
 Installable
 VMware VirtualCenter 2.0.x
 VMware VirtualCenter 2.5.x
 VMware vCenter Server 4.0.x

32nm Core™ i7	Note: Intel® i3/i5 Xeon® Clarkdale Series processors that do not support AESNI and PCLMULQDQ cannot be admitted to EVC modes higher than the Intel® Xeon® Core™ i7 mode.
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Table 1.2: Description of AMD EVC Baselines

EVC Baseline	Description
AMD Opteron™ Generation 1	Applies baseline feature set of AMD Opteron™ Generation 1 (Rev. E) processors to all hosts in the cluster.
AMD Opteron™ Generation 2	Applies baseline feature set of AMD Opteron™ Generation 2 (Rev. F) processors to all hosts in the cluster. Compared to the AMD Opteron™ Generation 1 EVC mode, this EVC mode exposes additional CPU features including CPMXCHG16B and RDTSCP.
AMD Opteron™ Generation 3	Applies baseline feature set of AMD Opteron™ Generation 3 (Greyhound) processors to all hosts in the cluster. Compared to the AMD Opteron™ Generation 2 EVC mode, this EVC mode exposes additional CPU features including SSE4A, MisAlignSSE, POPCOUNT and ABM (LZCNT).
AMD Opteron™ Generation 3 (no 3DNow!™)	Applies baseline feature set of AMD Opteron™ Generation 3 (Greyhound) processors, with 3DNow!™ support removed, to all hosts in the cluster. This mode allows you to prepare clusters containing AMD hosts to accept AMD processors without 3DNow!™ support.

Table 2: EVC Baselines supported in vCenter Server releases

vCenter Server Release	EVC Cluster Baseline							
	AMD Opteron™ Gen. 1	AMD Opteron™ Gen. 2	AMD Opteron™ Gen. 3	AMD Opteron™ Gen. 3 (no 3DNow!™)	Intel® Xeon® Core™ 2	Intel® Xeon® 45nm Core™ 2	Intel® Xeon® Core™ i7	Intel® Xeon® 32nm Core™ i7
VirtualCenter 2.5 U2 and later updates	Yes	No	No	No	Yes	No	No	No
vCenter Server 4.0	Yes	Yes	Yes	No	Yes	Yes	Yes	No
vCenter Server 4.0 U1 and later updates	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
vCenter Server 4.1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3.1: EVC Baselines on Intel CPUs

Note: In EVC clusters where the ESX host CPU model is Intel 3500 or 5500 series (Nehalem), ESX 3.5 Update 4 or later and VirtualCenter Server 2.5 Update 4 or later must be installed. For additional information, see [VMotion fails with an RDTSCP error in EVC clusters where the ESX Host CPU Model is Intel 3500 series or 5500 series \(Nehalem\) \(1011443\)](#). In EVC clusters where the ESX Host CPU model is Intel 3400 series, ESX 3.5 Update 5 or later and VirtualCenter Server 2.5 Update 5 or later must be installed.

Intel® Xeon® Host CPU Model	EVC Cluster Baseline			
	Intel® Xeon® Core™ 2 EVC Mode	Intel® Xeon® 45nm Core™ 2 EVC Mode	Intel® Xeon® Core™ i7 EVC Mode	Intel® Xeon® 32nm Core™ i7 EVC Mode
30xx Series	Yes	No	No	No
32xx Series	Yes	No	No	No
51xx Series	Yes	No	No	No
53xx Series	Yes	No	No	No
72xx Series	Yes	No	No	No
73xx Series	Yes	No	No	No
31xx Series	Yes	Yes	No	No
33xx Series	Yes	Yes	No	No
52xx Series	Yes	Yes	No	No
54xx Series	Yes	Yes	No	No
74xx Series	Yes	Yes	No	No
35xx Series	Yes	Yes	Yes	No
55xx Series	Yes	Yes	Yes	No
34xx Lynnfield Series	Yes	Yes	Yes	No
34xx Clarkdale Series without AES and PCLMULQDQ	Yes	Yes	Yes	No
65xx Series	Yes	Yes	Yes	No
75xx Series	Yes	Yes	Yes	No
i3/i5 Clarkdale Series without AES and PCLMULQDQ	Yes	Yes	Yes	No
34xx Clarkdale Series with AES and PCLMULQDQ	Yes	Yes	Yes	Yes
56xx Series	Yes	Yes	Yes	Yes
36xx Series	Yes	Yes	Yes	Yes

i3/i5 Clarkdale Series with AES and PCLMULQDQ	Yes	Yes	Yes	Yes
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Legend: CPU Architecture
Intel® Core™2 (Merom)
Intel® 45nm Core™2 (Penryn)
Intel® Core™ i7 (Nehalem)
Intel® 32nm Core™ i7 (Westmere)

Table 3.2: EVC Baselines on AMD CPUs

AMD Opteron™ Host CPU Model	EVC Cluster Baseline			
	AMD Opteron™ Generation 1 EVC Mode	AMD Opteron™ Generation 2 EVC Mode	AMD Opteron™ Generation 3 EVC Mode	AMD Opteron™ Generation 3 (no 3DNow!™) EVC Mode
1xx Series	Yes	No	No	No
2xx Series	Yes	No	No	No
8xx Series	Yes	No	No	No
12xx Series	Yes	Yes	No	No
22xx Series	Yes	Yes	No	No
82xx Series	Yes	Yes	No	No
13xx Series	Yes	Yes	Yes	Yes
23xx Series	Yes	Yes	Yes	Yes
24xx Series	Yes	Yes	Yes	Yes
83xx Series	Yes	Yes	Yes	Yes
84xx Series	Yes	Yes	Yes	Yes
61xx Series	Yes	Yes	Yes	Yes
41xx Series	Yes	Yes	Yes	Yes

Legend: CPU Architecture
AMD Opteron™ Generation 1 (Rev. E)
AMD Opteron™ Generation 2 (Rev. F)
AMD Opteron™ Generation 3 (Greyhound)

References:

- For a list of servers supported in an ESX release, see the VMware [Systems Compatibility Guide](#).
- For information on configuring EVC, see the "Migrating Virtual Machines" chapter in the [Basic System Administration Guide](#) for your ESX release.
- For general information on VMotion see the [VMotion Compatibility Info Guide](#).
- For general VMotion processor compatibility information, see [VMotion CPU Compatibility Requirements for Intel Processors \(1991\)](#) for Intel processors and [VMotion CPU Compatibility Requirements for AMD Processors \(1992\)](#) for AMD processors.
- For VMotion and Compatibility FAQs, see [EVC and CPU Compatibility FAQ \(1005764\)](#).
- For detecting and using CPU Features in applications, see [Detecting and Using CPU Features in Applications \(1005763\)](#).

Third-party references:

- The Intel processor spec finder, <http://processorfinder.intel.com/>
- The AMD products spec, <http://products.amd.com/en-us/>

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