

# System Tunable Mapping: Tru64 UNIX to HP-UX 11i v2



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## Overview

People often find that the general case for which systems are tuned fails to meet their needs. This document provides some information on the more common parameters that are tuned for Tru64 UNIX and the equivalent HP-UX parameters. This document provides information for HP-UX 11i v2.

On Tru64 UNIX, you can adjust the default resource limits with the `dxkerneltuner` or `sysconfig` commands. In order for the new values to take effect, some parameters require a system reboot but it is not necessary to rebuild the kernel.

On HP-UX, you can change the default values with the `kctune` command or the `kcweb` GUI. In order for the changes to take effect, some parameters require a reboot but a kernel build is never required. The document identifies which parameters require a reboot. A dynamic tunable is one whose value can be changed without a reboot. In all the mapping tables within this document, the 'Dynamic on HP-UX' column is used to indicate whether the tunable value can be changed without rebooting the system.

For details on any of these options, see the HP-UX manpages for each tuning parameter, and the Tru64 UNIX [sys\\_attrs\(5\)](#) reference page as well as reference pages on attributes for each subsystem. You can also consult the online information available at:

- [Reconfiguring the Kernel for HP-UX 11iV2](#)

## System Tuning Options

This section provides Tru64 UNIX to HP-UX tuning equivalence based on HP-UX 11i v2 for the following attributes:

- [System V IPC Message Queue Attributes](#)
- [System V IPC Semaphores Attributes](#)
- [System V Shared Memory Attributes](#)
- [Process and Thread Attributes](#)
- [Kernel Buffer Attributes](#)
- [Virtual Memory Attributes](#)
- [Asynchronous I/O Attributes](#)

### System V IPC Message Queue Attributes

All the System V message queue tunables are interrelated and should *not* be treated as independent variables. The tunables must be evaluated as a system to ensure that they reflect the application requirements. For more information on tuning System V IPC message queue parameters for HP-UX, refer to [Tuning SystemV IPC message-handling parameters on HP-UX 11i v2](#).

The following table shows the system tuning options for System V IPC message queue attributes:

Tru64 UNIX	HP-UX	Dynamic on HP-UX	Description
msg_max	msgmax	Yes	Maximum message size in bytes.
msg_mnb	msgmnb	Yes	Maximum message queue size in bytes.
msg_tql	msgtql	No	Maximum number of messages in the system at any time.
msg_mni	msgmni	No	Maximum number of systemwide message queues (IDs) allowed.

### **msg\_max (Tru64 UNIX) versus msgmax (HP-UX)**

This parameter defines the maximum allowable size, in bytes, of individual messages in a queue.

On Tru64 UNIX systems, increase the value of `msgmax` only if the applications being used on the system require larger messages. This parameter prevents malicious or poorly written programs from consuming excessive message buffer space.

The default value of this parameter is the same for Tru64 UNIX and HP-UX. However, the maximum value allowed for this parameter is higher for Tru64 UNIX than HP-UX. The maximum value for Tru64 UNIX is `INT_MAX`; the maximum value for HP-UX is  $(64 * 1024 * 1024)$ ,  $(msgssz * msgseg)$ , or `msgmnb`, whichever is smaller.

The `msgssz` tunable does not exist on Tru64 UNIX. On HP-UX, it specifies the size, in bytes, of a “segment” of memory space reserved for storing IPC messages.

### **msg\_mnb (Tru64 UNIX) versus msgmnb (HP-UX)**

This parameter specifies the maximum total combined size, in bytes, of all the messages queued in a given message queue at any one time.

The default value of this parameter is the same for Tru64 UNIX and HP-UX. However, the maximum value allowed for this parameter is higher for Tru64 UNIX than HP-UX. The maximum value for Tru64 UNIX is `INT_MAX`; the maximum value for HP-UX is  $(64 * 1024 * 1024)$  or  $(msgssz * msgseg)$ , whichever is smaller.

The `msgseg` tunable does not exist on Tru64 UNIX. On HP-UX, it specifies the total number of “segments” of systemwide shared memory message storage space that is shared among all IPC message queues.

### **msg\_tql (Tru64 UNIX) versus msgtql (HP-UX)**

This parameter specifies the maximum number of messages that are allowed to exist on the system at any given time.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 40 for Tru64 UNIX, and 1024 for HP-UX. The maximum value allowed for this parameter is different on Tru64 UNIX and HP-UX. The maximum value for Tru64 UNIX is `INT_MAX`; the maximum value for HP-UX is `msgseg`.

The `msgmap` tunable does not exist on Tru64 UNIX. On HP-UX it specifies the size of (number of entries in) the message space resource map that tracks the free space in shared IPC message space. The recommended value for this tunable is `msgtql+2`.

## **msg\_mni (Tru64 UNIX) versus msgmni (HP-UX)**

This parameter specifies the maximum number of message queues that can exist simultaneously on the system.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 50 for Tru64 UNIX, and 512 for HP-UX. The maximum value allowed on this parameter is higher for Tru64 UNIX than HP-UX. The maximum value for Tru64 UNIX is `INT_MAX`; the maximum value for HP-UX is 32767.

## **System V IPC Semaphores Attributes**

All the System V semaphore tunables are interrelated and should *not* be treated as independent variables. The tunables must be evaluated as a system to ensure they reflect the application requirements.

The following table shows the system tuning options for System V IPC semaphores attributes:

<b>Tru64 UNIX</b>	<b>HP-UX</b>	<b>Dynamic on HP-UX</b>	<b>Description</b>
<code>sem_aem</code>	<code>semaem</code>	No	Maximum amount a semaphore value can be changed by a semaphore "undo" operation.
<code>sem_mni</code>	<code>semmni</code>	No	Maximum number of semaphores identifiers that can be used on the system at one time.
<code>sem_msl</code>	<code>semmsl</code>	Yes	On Tru64, maximum number of semaphores per process at one time. On HP-UX, maximum number of semaphores per semaphore identifier.
<code>sem_ume</code>	<code>semume</code>	No	Maximum number of System V IPC undo entries per process.
<code>sem_vmx</code>	<code>semvmx</code>	No	Maximum value of any single System V IPC semaphore.
<code>sem_opm</code>	N/A	N/A	Maximum number of operations that can be outstanding on a single System V semaphore at one time. On HP-UX, <code>semopm</code> is not a tunable, but it is limited to 500.

## **sem\_aem (Tru64 UNIX) versus semaem (HP-UX)**

This parameter specifies the maximum cumulative "undo" value for any one semaphore as changed by any one single process.

The default value of this parameter is the same for Tru64 UNIX and HP-UX. However, the maximum value allowed on this parameter is higher for Tru64 UNIX than HP-UX. The maximum value for Tru64 UNIX is 65536; the maximum value for HP-UX is `semvmx` or 32767, whichever is smaller, on HP-UX.

## **sem\_mni (Tru64 UNIX) versus semmni (HP-UX)**

This parameter specifies the maximum number of IPC semaphore identifiers that can exist simultaneously on the system.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 10 (the system rounds the number to the value associated with the next higher power of two, which is 16)

for Tru64 UNIX and 2048 for HP-UX. The maximum value allowed on this parameter is different for Tru64 UNIX and HP-UX. The maximum value for Tru64 UNIX is `INT_MAX`; the maximum value for HP-UX is `semnms`. The default value for `semnms` is 4096; and the maximum value is 335534080 for HP-UX.

### **sem\_msl (Tru64 UNIX) versus semmsl (HP-UX)**

This parameter specifies the maximum number of individual System V IPC semaphores per semaphore identifier (ID). If an application attempts to exceed this limit, it will receive an `[EINVAL]` error from `semget()`.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 25 for Tru64 UNIX, and 2048 for HP-UX. The maximum value allowed on this parameter is different for Tru64 UNIX and HP-UX. It is `INT_MAX` for Tru64 UNIX; while it is 10240 for HP-UX.

### **sem\_ume (Tru64 UNIX) versus semume (HP-UX)**

This parameter specifies the maximum number of System V IPC semaphores upon which a single process can have outstanding (nonzero) "undo" operations.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 10 for Tru64 UNIX and 100 for HP-UX. The maximum value allowed on this parameter is different for Tru64 UNIX and HP-UX. The maximum value for Tru64 UNIX is `INT_MAX`; the maximum value for HP-UX is `semnms`. The default value of `semnms` is 4096; and the maximum value is 335534080.

### **sem\_vmx (Tru64 UNIX) versus semvmx (HP-UX)**

This parameter specifies the maximum value any given System V IPC semaphore can have.

The default value and maximum values for this parameter are the same for Tru64 UNIX and HP-UX.

**Note:** On HP-UX, the `semnms` tunable specifies the number of System V IPC systemwide semaphores; the `semnmu` tunable specifies the maximum number of System V IPC undo structures for processes. These two tunables do not exist on Tru64 UNIX.

## System V Shared Memory Attributes

The following table shows the system tuning options for System V shared memory attributes:

Tru64 UNIX	HP-UX	Dynamic on HP-UX	Description
<code>shm_seg</code>	<code>shmseg</code>	Yes	Maximum number of System V shared memory segments per process.
<code>shm_mni</code>	<code>shmmni</code>	Yes	Number of System V shared memory segment identifiers in the system.
<code>shm_max</code>	<code>shmmax</code>	Yes	Maximum size, in bytes, for a System V shared memory segment.

### **shm\_seg (Tru64 UNIX) versus shmseg (HP-UX)**

This parameter specifies the maximum number of System V shared memory segments per process.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 32 for Tru64 UNIX and 300 for HP-UX. The maximum value allowed on this parameter is different for Tru64 UNIX and HP-UX. The maximum value for Tru64 UNIX is  $2^{31}-1$ ; the maximum value for HP-UX is any value less than or equal to `shmmni`.

### **shm\_mni (Tru64 UNIX) versus shmmni (HP-UX)**

This parameter specifies the number of System V shared memory segment identifiers in the system.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 100 for Tru64 UNIX and 400 for HP-UX. The maximum value allowed on this parameter is different for Tru64 UNIX and HP-UX. The maximum value for Tru64 UNIX is  $2^{31}-1$ ; the maximum value for HP-UX is 32768.

### **shm\_max (Tru64 UNIX) versus shmmax (HP-UX)**

This parameter specifies the maximum size (in bytes) for a System V shared memory segment.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 4 MB for Tru64 UNIX, and 1 GB for HP-UX. The maximum value allowed on this parameter is different for Tru64 UNIX and HP-UX. It is  $2^{64}-1$  for Tru64 UNIX; while it is any value less than or equal to  $2^{42}$  for HP-UX.

## Process and Thread Attributes

The following table shows the system tuning options for process and thread attributes:

Tru64 UNIX	HP-UX	Dynamic on HP-UX	Description
max_proc_per_user	maxuprc	Yes	Limits the maximum number of user processes per user.
max_threads_per_user	max_thread_proc	Yes	On Tru64 UNIX, defines the maximum number of threads per user ID. On HP-UX, defines the maximum number of threads allowed per process.
max_per_proc_stack_size	maxssiz (32-bit) or maxssiz_64bit (64-bit)	Yes	Maximum size, in bytes, of the stack for any user process.
per_proc_stack_size	N/A	N/A	Default limit, in bytes, for a user process stack.
max_per_proc_data_size	maxdsiz (32-bit) or maxdsiz_64bit (64-bit)	Yes	Maximum size, in bytes, of the data segment for any user process.
per_proc_data_size	N/A	N/A	Default limit, in bytes, for a process data segment.
max_per_proc_address_space	N/A	N/A	Maximum usable virtual address space per process.
per_proc_address_space	N/A	N/A	Default usable virtual address space per process.

### **max\_proc\_per\_user (Tru64 UNIX) versus maxuprc (HP-UX)**

This parameter limits the maximum number of processes per user.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default for Tru64 UNIX is 524287; the default for HP-UX is 256, and the maximum value is (*nproc* - 5).

### **max\_threads\_per\_user (Tru64 UNIX) versus max\_thread\_proc (HP-UX)**

For Tru64 UNIX, this parameter defines the maximum number of threads per user.

For HP-UX, this parameter defines the maximum number of concurrent threads allowed per process.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 1024 for Tru64 UNIX, and 256 for HP-UX. The maximum value allowed on this parameter is higher on Tru64 UNIX than HP-UX. The maximum value for Tru64 UNIX is `LONG_MAX`; the maximum value for HP-UX is `nkthread`.

### **max\_per\_proc\_stack\_size (Tru64 UNIX) versus maxssiz or maxssiz\_64bit (HP-UX)**

For Tru64 UNIX, `max_per_proc_stack_size` is the hard limit for the stack size per process. The `per_proc_stack_size` parameter defines the soft limit for stack size, up to the hard limit `max_per_proc_stack_size`.

For HP-UX, `maxssiz` and `maxssiz_64bit` define the maximum size of the stack segment for 32-bit and 64-bit processes, respectively.

The default value of this parameter is different on Tru64 UNIX and HP-UX. The default setting is 32 MB for Tru64 UNIX, 8 MB for 32-bit process on HP-UX, and 256 MB for 64-bit process on HP-UX. The maximum value allowed on this parameter is higher for Tru64 UNIX than HP-UX. The maximum value for Tru64 UNIX is `0x400000000000`; the maximum value for HP-UX is `0x17F00000` (32-bit) and `0x80000000` (64-bit).

### **max\_per\_proc\_data\_size (Tru64 UNIX) versus maxdsiz or maxdsiz\_64bit (HP-UX)**

For Tru64 UNIX, `max_per_proc_data_size` is the hard limit for data segment size per process. The `per_proc_data_size` parameter defines the soft limit for data segment size up to the hard limit `max_per_proc_data_size`.

For HP-UX, `maxdsiz` and `maxdsiz_64bit` define the maximum size, in bytes, of the data segment for any user process.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 1 GB for Tru64 UNIX, 1 GB for 32-bit processes on HP-UX, and 4 GB for 64-bit processes on HP-UX. The maximum value allowed on this parameter is higher for Tru64 UNIX than HP-UX. The maximum value for Tru64 UNIX is `0x400000000000`; the maximum value for HP-UX is `0xffff000` (32-bit) and `0x3ffbffff000` (64-bit).

**Note:** For more information on hard and soft limits on Tru64 UNIX, refer to the [ulimit\(1\)](#) and [getrlimit\(2\)/setrlimit\(2\)](#) online reference pages. On HP-UX, the `maxtsiz` and `maxtsiz_64bit` tunables define the maximum size, in bytes, of the text segment for any user process. These two tunables do not exist on Tru64 UNIX.

## Kernel Buffer Attributes

The following table shows the system tuning options for kernel buffer attributes:

Tru64 UNIX	HP-UX	Dynamic on HP-UX	Description
bufcache	nbuf and bufages (both deprecated on HP-UX 11i v2)	No	On HP-UX, sets the systemwide number of file-system buffer and cache buffer headers. The parameters are for backwards compatibility and should be set to 0 because the dynamic buffer cache is preferred.
ubc_minpercent	dbc_min_pct	Yes	The minimum percentage of physical memory to be used by the dynamic buffer cache.
ubc_maxpercent	dbc_max_pct	Yes	Maximum percentage of physical memory for dynamic buffer cache.
ubc_borrowpercent	N/A	N/A	Percentage of memory above which the UBC is only borrowing memory from the virtual memory.

### **ubc\_minpercent (Tru64 UNIX) versus dbc\_min\_pct (HP-UX)**

This parameter specifies the minimum percentage of physical memory to be used by the dynamic buffer cache.

For Tru64 UNIX, the default value of this parameter is 10 percent. The maximum allowed value is 100 percent; the minimum value is 0 percent.

For HP-UX, the default value of this parameter is 5 percent of physical memory. The maximum allowed value is 70 percent of physical memory, and the minimum is 1 percent of physical memory. The value is further constrained in that it must be equal to or less than `dbc_max_pct`.

### **ubc\_maxpercent (Tru64 UNIX) versus dbc\_max\_pct (HP-UX)**

This parameter specifies the maximum percentage of physical memory to be used by the dynamic buffer cache.

For Tru64 UNIX, the default value of this parameter is 100 percent. The maximum allowed value is 100 percent; the minimum allowed value is 0 percent.

For HP-UX, the default value of this parameter is 50 percent of physical memory. The maximum allowed value is 90 percent of physical memory, and the minimum 1 percent of physical memory. The value is further constrained in that it must be equal to or greater than `dbc_min_pct`.

## Virtual Memory Attributes

The following table shows the system tuning options for virtual memory attributes based on HP-UX:

Tru64 UNIX	HP-UX	Dynamic on HP-UX	Description
gh_chunks	N/A	N/A	Number of 4-MB chunks of memory reserved at boot time for shared-memory use.
rad_gh_regions[n]	N/A	N/A	For NUMA systems, the granularity hints chunk size (in MB) for the Resource Affinity Domain (RAD) identified by <i>n</i> .
maxvas (Version 4.0x only)	N/A	N/A	Maximum Virtual Address Space.
vpagemax (Version 4.0x only)	N/A	N/A	Maximum Protected Pages.
mapentries (Version 4.0x only)	N/A	N/A	VM maximum map entries.
executable_stack	executable_stack	No	Controls if the stack is executable (Boolean). The HP-UX 11i v2 default is 0. The Tru64 UNIX default is 0.

There are no equivalences on HP-UX for most of Tru64 UNIX `vm` parameters. For more information on system attributes for the `vm` kernel subsystem on Tru64 UNIX, refer to the [sys\\_attrs\\_vm\(5\)](#) reference page for your version of Tru64 UNIX.

## Asynchronous I/O Attributes

The following table shows the system tuning options for asynchronous I/O attributes based on HP-UX:

Tru64 UNIX	HP-UX	Dynamic on HP-UX	Description
aio_listio_max_num	aio_listio_max	Yes	Maximum number of POSIX asynchronous I/O operations allowed in a single <code>lio_listio()</code> call.
aio_max_percent	N/A	N/A	Maximum percentage of physical memory that AIO structures can occupy.
aio_task_max_num	N/A	N/A	Number of AIO requests that can be wired in physical memory by restricting the amount of wired physical memory available for a specified number of tasks.

### **aio\_listio\_max\_num (Tru64 UNIX) versus aio\_listio\_max (HP-UX)**

This parameter defines the maximum number of asynchronous I/O requests supported on the list initiated by the `lio_listio()` function.

The default value of this parameter is different for Tru64 UNIX and HP-UX. The default setting is 64 for Tru64 UNIX, and 256 for HP-UX. The maximum value allowed on this parameter is 256 for Tru64 UNIX, the maximum value allowed is 65536 for HP-UX.

## For more information

- [Simplify Integrity Performance Web site](#)
- [HP-UX Performance Forum](#)
- [Tuning SystemV IPC message-handling parameters on HP-UX 11iV2](#)
- [Reconfiguring the Kernel for HP-UX 11iV2](#)
- [Tru64 UNIX System Configuration and Tuning](#)
- For questions, contact:  
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