

Server Tuning on HP-UX



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Executive summary

Kernel tunables are kernel configuration variables that allow the operating system to be configured to fit specific system needs, resulting in better performance and/or more efficient allocation of resources. The default parameter settings provide reasonable performance but the optimal values may depend on a system's hardware configuration and the mix of applications that the system runs.

The **Server-Tunables** product sets kernel tunables to values appropriate for major customer business application workloads such as Oracle RDBMS and SAP R/3. Installing and running the Server-Tunables product will provide a jump-start towards optimal performance for business applications. The Server-Tunables product is a component of the **Tune-N-Tools** bundle.

Where to start tuning for performance?

HP-UX 11iv3 provides 184 configurable kernel parameters. Additionally, HP-UX 11i v3 has 139 private parameters which are not visible to the customer as long these have the default value. In general, kernel parameter default values are dependent on the physical size of the system, the best knowledge of the development engineer, and are set at the time of the cold install of HP-UX.

Therefore, the kernel parameter default values are not necessarily set to be optimal for a specific workload. However, to reach higher system performance HP-UX allows the customer to optimize kernel parameters for a specific workload and to have kernel parameters set to meet the ISV requirements. To tune or customize the system is a time consuming process for the customer.

The Server-Tunables product saves the customer the effort of doing the first level of performance tuning. In one simple operation the most important kernel parameters are set to an appropriate level for major applications on server-class systems. Some application products have specific requirements for parameter settings and the Server-Tunables product will meet those minimum requirements. In some cases additional, incremental, performance improvements may be made by additional changes to kernel tunables but the performance improvements achieved with the Server-Tunables product will usually be significant.

Who should install the Server-Tunables product?

The Server-Tunables product is designed to permit the installation and operation of major ISVs such as Oracle and SAP and to improve the system performance of servers running such workloads. The change to the tunable values is primarily to increase system limits consistent with larger systems. The product contains scripts that interrogate the system configuration and set the tunable variables in a manner consistent with the system size. Therefore, it is safe to install the Server-Tunables product on any size system.

Performance improvements from the installation and running of the Server-Tunables product will be most significant on server-class systems running workloads such as database servers and application servers. Smaller systems and systems running different workloads may experience less performance improvement.

What tunable values are changed?

Each version of the Server-Tunables product will potentially modify a different set of tunables and will set them to different values than other versions. Each version of the Server-Tunables script may base the tunable values on different system configuration characteristics and may take into account the version of the operating system running on the system.

The kernel tunable values being set in version 11.31.01 of the Server-Tunables product are shown in Table 1.

Table 1. Tunable values for version 11.31.01

Tunable	New Value	Default Value	Remarks
max_async_ports	maxuprc	4096	
maxfiles	8192	2048	
maxfiles_lim	8192	4096	
max_thread_proc	3000	256	
maxuprc	27000	256	approximately 250*cpucnt
nproc	30000	4200	approximately 1.1*maxuprc (limited by process_id_max – process_id_min, i.e. max 30000)
msgmnb	65356	16384	
msgmni	4096	512	
msgtql	4096	1024	
nkthread	250000	8416	
nstrpty	200	60	
npty	200	60	
semmni	8192	2048	
semmns	60000	4096	should be >= nproc
semmnu	27000	256	or 4096, depending on available system memory.
Semmsl	128	2048	
semume	512	100	
maxdsiz	3GB	1GB	
maxdsiz_64bit	256GB	4GB	

maxssiz_64bit	1GB	256MB
maxtsiz	1GB	96MB
maxtsiz_64bit	8GB	1GB
vps_ceiling	64	16
vps_chatr_ceiling	4194304	1048576
swchunk	65536	2048
shmmmax	4096GB	1GB
shmmni	4096	530
O_sync_is_o_dsync	1	0

Interaction with other sources of kernel tuning

User-defined tunable settings

The Server-Tunables script will not override a kernel parameter if it has been modified from its default value to a value larger than would be set by Server-Tunables. In other words, Server-Tunables will not reduce the capacity of the system if the administrator has already set a particular tunable parameter.

Oracle-derived settings

The kernel parameters set by Server-Tunables are compatible with the parameters recommended by Oracle in the Oracle Database Installation Guide (see Appendix A).

Java-derived settings

The Server-Tunables product will set parameters that match or exceed those recommended by HPJconfig.

Summary

Installing and running the Server-Tunables product is an easy way to assure good performance on your database server or application server. Further performance improvements may be achieved through measurement and additional tuning using the tools and techniques that HP-UX provides but the first step on the path to better performance should be the Server-Tunables product.

Appendix A

The following information is from the [Oracle® Database Online Documentation](#).

The kernel parameter values shown in this section are recommended values only. For production database systems, Oracle® recommends that you tune these values to optimize the performance of the system. See your operating system documentation for more information about tuning kernel parameters.

Verify that the kernel parameters shown in the following table are set either to the formula shown, or to values greater than or equal to the recommended value shown.

Parameter	Recommended Formula or Value
ksi_alloc_max	$(nproc * 8)$
executable_stack	0
max_thread_proc	1024
maxdsiz	1073741824 (1 GB)
maxdsiz_64bit	2147483648 (2 GB)
maxssiz	134217728 (128 MB)
maxssiz_64bit	1073741824 (1 GB)
maxuprc	$((nproc * 9) / 10)$
msgmap	$(msgtql + 2)$
msgmni	$(nproc)$
msgseg	32767
msgtql	$(nproc)$
ncsize	$(ninode + 1024)$
nfile	$(15 * nproc + 2048)$
nflocks	$(nproc)$
ninode	$(8 * nproc + 2048)$
nkthread	$((nproc * 7) / 4) + 16$
nproc	4096
semmni	$(nproc)$
semmsns	$(semmni * 2)$
semmsnu	$(nproc - 4)$
semvmx	32767
shmmmax	The size of memory or 1073741824 (0X40000000), whichever is greater. Note: To avoid performance degradation, the value should be greater than or equal to the size of the available memory.
shmmni	4096
shmseg	512

Parameter	Recommended Formula or Value
vps_ceiling	64

For more information

For more detailed information on the function of particular kernel tunables, see the [Tunable Kernel Parameters](#) white paper. When doing additional modification of kernel tunables it might be a good idea to check on [Common Mis-configured HP-UX Resources](#). The Veritas file system requires special expertise to tune. See [JFS Tuning and Performance](#) for more information.

The HP technical documentation library may be found at <http://docs.hp.com/>. The library contains documents on Performance Tools and Performance Tuning.

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