



UNIVA CORPORATION

GRID ENGINE DOCUMENTATION

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# Grid Engine Release Notes

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## 2 Supported Operating Systems, Versions and Architectures

Univa Grid Engine supports various platforms, hardware architectures and versions of operating systems. Find the full list in following table:

Operating System	Version	Architecture
SLES	10,11,12	x86, x86-64
RHEL	5 or higher, 6 or higher, 7	x86, x86-64
CentOS	5 or higher, 6 or higher, 7	x86, x86-64
Oracle Linux	5 or higher, 6 or higher, 7	x86, x86-64
Ubuntu	10.04LTS - 14.04LTS	x86, x86-64
Oracle Solaris	10, 11	x86-64, SPARC 64bit
HP-UX	11.0 or higher	64bit
IBM AIX	6.1 or later	64bit
Apple OS X	10.8 (Mountain Lion) or higher	x86, x86-64
Microsoft Windows	XP Professional (SP3)	32 bit
Microsoft Windows	Server 2003 / 2003 R2	32 bit
Microsoft Windows	Vista Enterprise / Ultimate	32 and 64bit
Microsoft Windows	Server 2008 / 2008 R2	32 and 64bit
Microsoft Windows	7 Professional / Enterprise / Ultimate	32 and 64bit
Microsoft Windows	Server 2012 / 2012 R2	32 and 64bit
Microsoft Windows	8 / 8.1 Pro / Enterprise	32 and 64bit
Microsoft Windows	10 Pro / Enterprise	32 and 64bit

Table 1: Supported Operating Systems, Versions and Architectures

*PLEASE NOTE:* Hosts running the Microsoft Windows operations system cannot be used as master or shadow hosts.

*PLEASE NOTE:* Univa Grid Engine qmaster is fully supported on Linux and Solaris. We provide binaries in Univa Grid Engine for running the qmaster on other operating systems but they are not supported and delivered as a courtesy. If you require qmaster support on other architectures please contact us at support@univa.com.

*PLEASE NOTE::* if you require Univa Grid Engine support for older versions of the above operating systems please contact our sales or support team.

## 3 Fixes and Enhancements

### 3.1 Summary

#### 3.1.1 Docker integration

##### Features of the Docker integration

Univa Grid Engine 8.4.1 provides an integration with Docker containers. This allows users to specify that a job has to be started in a Docker container that was created from a specific Docker image. Please see chapter 7.9 “Jobs using Docker Containers” in the UsersGuide and chapter 2.5.2 “Configuring Queues” in the AdminsGuide for details.

##### Known issues and limitations of the Docker integration

- Requirements:
  - Host architecture: lx-amd64. Other architectures are not supported yet.
  - Docker version: from 1.8.2 to 1.10.3. The Docker API is often changed and not in a backwards compatible way, so later versions of Docker are not supported. The integration might work there, but without warranty.
- Currently, always a job must be specified to be run in a container. If in the Docker image an application is specified to be automatically started at container creation time, this is overwritten by the specified job.
- Sometimes, the Docker daemon responds with a valid, but empty message to the “docker images” request. The execution daemon cannot distinguish this from a valid response of a Docker installation with no images available. If the execution daemon has a job to start when it gets such an empty message, then this job fails, because the execution daemon assumes the image was deleted and the job cannot be started.
- Checkpointing a job that runs in an container is not supported.
- Only “builtin” interactive jobs are supported in containers.
- The `-xd` submission switch is added as an experimental feature. There might be issues with more sophisticated use cases, e.g. the combination of multiple switches for network settings or duplicate specification of data. The `-xdv` switch is deprecated and can be replaced by `-xd -v`.

#### 3.1.2 Host resolving and `host_aliases` file

- The host name reported by a load sensor will get resolved at execution side now. Settings in the `host_aliases` file are now also used for load reports via external load sensors.
- At startup of qmaster it will verify hostname resolution of spooled objects in the database. If the resulting host names have changed for hosts referenced in the configuration list, the admin host list, the execd list or in the submit host list then all spooled data objects will get adjusted to match the new resulting hostnames.
- The resource hostname request (`-l h=<expr>`) now supports resolving plain hostnames in regular expression requests. This also includes using aliased hostnames.
- It is now supported to add new entries to the `host_aliases` file while qmaster daemon is running. Changing already referenced host names will need a qmaster restart. If a change to the current `host_aliases` needs a restart the qmaster process will log this information

into the messages file. In order to change already active host aliases during runtime the corresponding hosts must be removed from Univa Grid Engine. A hostname change that affects the interface of a running `sge_qmaster` service or `sge_execd` service will always need a restart of the service (no change in behavior).

- The client tools `qping` and `gethostbyname` got a new option (`-all_rr`) to show the resulting host name after resolving on the service. This tools can be used to wait until a running `qmaster` has taken over changes to the `host_aliases` file.
- It is possible to set individual `qmaster` parameters for internal host name cache (via `qmaster_params`). The number of cached entries can be obtained via `qping` or `PROF_COMMLIB_TIME` `qmaster` param.

### 3.1.3 Scheduler specific changes

- The scheduler configuration parameter “`params`” can be used to enable profiling (`PROFILE=true`). In combination with the value of “`WARN_DISPATCHING_TIME`” it can be used to show additional information about the longest and shortest job scheduling time.
- The scheduler profiling is now thread based on architectures that supports thread specific user and system time measurement (linux kernel  $\geq 2.6.26$  and solaris operating systems). This results in correct system and user times for the scheduler thread. On other architectures the user and system times are measured for the entire process. This means that only the wallclock times are reflecting the overhead of the scheduler thread. System and user times will show the usage of all threads of the process in this case and is therefore not only scheduler thread specific.
- The profiling summary for the scheduler thread will contain information about time used for RQS (Resource Quota Sets) calculation. If some RQS Rule has an unexpected high influence on scheduling time the profiling data for this rule will also occur in the profiling output.
- Defined RQS are now sorted alphanumerically on their names in order to have the possibility to define a clear RQS processing order while the scheduler is dispatching the jobs. The processing order might have an influence on the scheduling time and can be optimized now. The rule that limits the most should be the first one.
- The schedule info messages provided by `qsub/qalter -w ...` command might now provide different messages because filter rules which are used by scheduler are active now. The resulting scheduling information provided by the simulated scheduling run via `qsub/qalter -w` should produce better results now.

## 3.2 Full List of Fixes and Enhancements

Univa Grid Engine 8.4.0alpha (also fixed for a 8.3 patch release)

- GE-2716 interactive jobs (qlogin, qrsh without command) don't set the TZ environment variable correctly
- GE-3392 Job reservation with wildcards in PE names doesn't work correctly
- GE-3858 pe job does not start: cannot run in PE "my\_pe" because it only offers 2147483648 slots
- GE-4229 Reduce executable sizes by removing extra symbols
- GE-4288 Confusing message on h\_rt or s\_rt limit
- GE-4293 qsub -w e -l exclusive=true rejects job, even if the request is valid (THIS FIX WAS WITHDRAWN FOR 8.4.0)
- GE-4296 the unit of the io usage value is missing in qstat -j <job\_id> output and not explained in the man page
- GE-4297 report io wait time and number of io operations
- GE-4384 User lists do not handle space separated user names correctly
- GE-4404 Rounding error, when memory values are reported by execd
- GE-4641 jobs with high job\_id may starve when job\_id roll over happens when wait\_time is not recognized in job priority calculation
- GE-4739 print unique thread names in messages file
- GE-4943 shepherd closes FDs, needed by AD authentication
- GE-4983 port DRMAA2 C API to other architectures
- GE-5033 setting ENABLE\_SUBMIT\_LIB\_PATH in qmaster\_params has no effect for LD\_PRELOAD env variable
- GE-5045 qlogin and qrsh without command does not inherit expected variables (e.g. TERM)
- GE-5074 sessionusers ACL not present after installation
- GE-5081 wrong reference to "MONITOR\_TIME" in admin guide
- GE-5156 Non-existing paths for input and error files should be implicitly created
- GE-5268 event client id of DRMAA2 event clients displayed as "unknown"
- GE-5289 add a note about the msvc redistrib dll to the installation guide
- GE-5340 hard coded timeout for PE \*\_proc\_args, prolog, epilog of 120 s not documented and changeable
- GE-5401 h\_vmem kill done by execd even when cgroups is setup to handle this limit
- GE-5486 introduce per job profiling
- GE-5487 introduce performance improvement for -masterq switch
- GE-5536 requesting more than one tmpdir per job
- GE-5543 drmaa2 functions drmaa2\_get\_drmaa\_name() and drmaa2\_get\_drmaa\_version() are missing
- GE-5557 Add functionality to search primary and secondary groups when '@' used to specify group in Grid Engine
- GE-5587 allow the Cray XC load sensor to update the slots counter in the queue
- GE-5588 communication errors at first startup not logged into /tmp/execd\_messages.<pid> file
- GE-5595 GetAdminUser() fails and is setting ADMINUSER to 'default'

- GE-5597 with accounting\_summary=true, "wallclock" usage of PE jobs is wrong
- GE-5605 test and release qping.exe for win-x86
- GE-5619 drmaa2\_\*session\_create() should ignore contact string instead of expecting null
- GE-5620 drmaa2\_open\_msession() should return a msession handle even msession is opened already
- GE-5624 Unix group entries in predefined userlist as well as manager or operator list are ignored
- GE-5625 CUDA and XEON PHI complex attribute installation fails
- GE-5637 jsv task job related params are not transferred for 1 task arrays
- GE-5638 Windows (win-x86) does not forward or collect the job exit code
- GE-5639 gid range observation not always un-blocking additional group ids
- GE-5641 user list man page should mention all predefined lists or list with a special meaning
- GE-5643 qalter -when now does not work for PE jobs with exclusive consumables
- GE-5647 qconf -mu, -au, -du triggers crashes when RQS'es are configured
- GE-5649 add an automated TS test for the error scenario
- GE-5653 ulx-amd64 packages seem not to be built with HWLOC library
- GE-5654 execd crashes on win-x86 when sending a job related admin mail
- GE-5655 Qmaster get unresponsive after error "invalid task number 0"
- GE-5656 qconf -ke does not completely cleanup execd information
- GE-5663 setting host to unheard might block qmaster under certain conditions
- GE-5664 array jobs can oversubscribe consumables with qalter -when now
- GE-5672 develop library to communicate with the Docker Remote API
- GE-5673 job lost detection is logging strange error regarding granted resource list
- GE-5674 qmaster crash can be trigger with qconf -mattr on an execd object.
- GE-5678 implement load sensor that reports docker version and available images
- GE-5679 add a "-xdv" switch to the submit clients to allow the user to specify directories to mount into a Docker container
- GE-5680 forward information about the selected Docker image and the paths to mount to the shepherd
- GE-5681 make sure Docker jobs are not registered in PDC/PTF
- GE-5682 use Docker API to get online usage of a job
- GE-5684 cleanup finished Docker containers after job ended
- GE-5685 implement a coshepherd that is started in a Docker container to keep it alive and to run methods and the job
- GE-5687 use Docker Remote API to run methods and job and signal container
- GE-5689 fix support for foreign filedescriptors in commlib
- GE-5690 qquota "limit" value rendered as -2^31 for large limits
- GE-5693 fix container stats acquisition via docker communication library
- GE-5694 Designation of events in logs - many events are labeled as 'Errors', where perhaps they should be 'Warnings'.
- GE-5703 non-admin user cannot trigger preemption of own jobs
- GE-5718 lothread needs to send reservation information to

License Orchestrator

- GE-5722 preempted LO job stays in "dr" state after qdel
- GE-5723 qalter -p not transferred to LO
- GE-5728 suspend/unsuspend endless loop for Preemption of jobs with the same priority
- GE-5731 qmod -p is only allowed on admin-hosts
- GE-5732 User should get a warning when preempting a higher prio job
- GE-5734 execd dumps core when a large tightly integrated parallel job is submitted to that host
- GE-5737 for Docker jobs, adjust paths in environment variables set by the container\_coshepherd
- GE-5740 fix libnuma dependency of shepherd to allow starting the coshepherd in the container
- GE-5741 rework container start mechanism in shepherd
- GE-5745 Add a man page containing all kind of error codes
- GE-5746 give the docker containers meaningful names
- GE-5750 cleanup container creation struct
- GE-5756 make the 'docker' and 'docker\_images' complexes builtins
- GE-5757 qmaster/execd/job protocol lacks check for active\_jobs cleanup
- GE-5759 show statistics about request types in worker and reader request queues
- GE-5760 add information about start and end (duration) of requests to the DEBUG log\_level
- GE-5763 improve per thread profiling
- GE-5764 create a man page sge\_diagnostics that summarizes and explains output of profiling/monitoring/logging/debug functionalities of UGE and LO
- GE-5767 Add a means to limit the job script size
- GE-5768 keep\_active sends all files of a job regardless of the file size
- GE-5770 add a means to switch on and off debug logging (DPRINTF) of sge\_qmaster during runtime
- GE-5775 improve logging in all Docker related components
- GE-5779 improve error handling in communication with docker daemon
- GE-5796 qmaster crashes with MONITOR\_REQUEST\_QUEUES=1
- GE-5798 performance regression with RQS rules
- GE-5803 enhance error logging of Windows (win-x86) qloadsensor.exe
- GE-5807 enhance scheduler profiling to show information for RQS calculation
- GE-5813 On Windows (win-x86), the execd cannot send the first CR to the qloadsensor.exe, causing it to never send load
- GE-5814 On Windows (win-x86), the execd logs a misleading warning about load sensors at startup time
- GE-5816 commlib external file descriptor support not thread save
- GE-5817 Docker jobs fail if the mount points of the binds are not unique
- GE-5818 resource quota cleanup for profiling
- GE-5825 improve qdel performance for bulk job deletions
- GE-5829 Docker jobs fail to start on some Linuxes because MemorySwappiness cannot be set
- GE-5845 possible race condition in event master at event client registration or total update

- GE-5851 jemalloc 3.6.0 can cause qmaster core dump
- GE-5853 qalter -tc prints incorrect success message
- GE-5858 job\_load\_adjustments may prevent any job dispatching in scheduler run after parallel job was scheduled
- GE-5860 communication specific enhancements for profiling and startup behavior
- GE-5865 keep\_active option does not copy all job related files into faulty job directory
- GE-5870 confirm Windows 10 Pro/Enterprise support and add it to list of supported OS
- GE-5876 where and what data structures are not used to prepare data for event clients
- GE-5878 inplace upgrade with postgres spooling breaks the upgrade script (inst\_sge -upd)
- GE-5880 profiling shows zero value for utilization in some scheduler profiling lines
- GE-5894 cluster queues are rejected due to missing project even if job has a project request
- GE-5895 hosts or qinstances are skipped by dispatch algorithm in scheduler but no valid reason is shown.
- GE-5902 a pe job requesting a per slot memory resource is not scheduled despite sufficient resources available
- GE-5907 shepherd aborts after a tightly integrated job was killed
- GE-5915 locale of qmaster process gets distorted by JVM\_thread
- GE-5917 jobs are not dispatched with open ended PE requests
- GE-5925 wrong qdel message when a job is already in deletion
- GE-5929 sge\_qmaster crashes when submitting a job to advance reservation using d\_rt.
- GE-5932 qghost and qmon round NLOAD to integer

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- GE-4497 PE job is not scheduled when a non-requestable consumable is setup in global host
- GE-4603 Job 124205 cannot run in PE "OpenMP" because it only offers 0 slots
- GE-4908 native Windows (win-x86) binaries can't find the SGE\_ROOT directory if it is the root directory of a share
- GE-5123 qdel array syntax from manpage fails
- GE-5129 regular "ckpt\_command" in CKPT interface not executed
- GE-5135 user has to login at least one time on each native Windows (win-x86) exec host to get the PROFILE created
- GE-5258 Using qconf for creating GDI sessions always returns exit status 1
- GE-5345 UGE to auto resolve host\_aliases
- GE-5509 host\_aliases not working for resource hostname OR request
- GE-5510 host\_aliases not working for qconf -purge request
- GE-5528 hostname resolving changes should trigger update of all affected data objects at qmaster/execd daemon startup

- GE-5559 Grid Engine upgrade procedure is running into an issue with chmod call
- GE-5667 describe in win-x86 installer and documentation that the UGE Starter Service doesn't work with mounted network directories
- GE-5671 integration of Docker into UGE
- GE-5692 enhance sge\_container\_shepherd to handle stdin/stdout/stderr stream to allow interactive and parallel jobs
- GE-5710 changed host aliases can trigger qmaster abort() at startup
- GE-5712 need concurrent array jobs where either all tasks run concurrently or no task at all
- GE-5714 unbelievable high ru\_wallclock values in accounting
- GE-5739 qmaster installation script does not add admin host if its hostname cannot be resolved (error message unclear)
- GE-5747 sharetree might be wrong if host clock changes
- GE-5758 possible segmentation fault in commlib when static clients try do reconnect
- GE-5776 bind lists of UGE directories properly into the Docker container
- GE-5780 update openssl library to current version 1.0.2
- GE-5781 exec host goes into unknown (u) state when the system time is set to an earlier time
- GE-5787 reported wallclock time is too low when the system time is set to an earlier time
- GE-5792 docker jobs are reported as failed on execd restart
- GE-5793 Qmaster uninstall script tries to remove startup-script even if it was not installed
- GE-5795 exit dispatching loop immediately when shutdown of scheduler thread is triggered
- GE-5820 update Cray XC documentation
- GE-5821 remove basic Docker integration that uses load sensor and starter\_method when real Docker integration works
- GE-5824 fix spelling mistakes in Grid Engine output messages
- GE-5834 bad performance of RQS rules on host groups
- GE-5836 during scheduling messages explaining why a job is not scheduled are generated but not used
- GE-5844 ship SGI MPT integration in Univa Grid Engine mpi folder
- GE-5877 max\_aj\_instances and -tc submit option are not respected with enrolled tasks
- GE-5879 when max\_aj\_instances is set to 0 (unlimited) the submit option -tc does no longer have effect
- GE-5913 On native Windows (win-x86), improve error logging of wl\_connect\_to\_service() function and subfunctions
- GE-5920 not all functions retrieving passwd information do resize used buffer if it turns out that it is too small
- GE-5935 header of HTTP response from Docker daemon > 1.9 not handled properly
- GE-5937 Typo in UGE Admin Guide
- GE-5955 host\_aliases not working for sge\_shadowd
- GE-5962 the Docker daemon doesn't download an image when its not



available locally

#### Univa Grid Engine 8.4.0beta1

- GE-5956 update jemalloc to version 4.1.0
- GE-5975 upgrade reports: The built-in complex "docker\_images" cannot be deleted
- GE-5977 update openssl library to version 1.0.2h
  - fixed several memory leaks in sge\_qmaster

#### Univa Grid Engine 8.4.0beta2

- GE-5983 qmake crashes on sol-sparc64
- GE-5589 changes to host\_aliases file should be updated when hosts are re-resolved

#### Univa Grid Engine 8.4.0

- GE-5991 host names used for host\_aliases should be handled case insensitive
- GE-5994 sge\_qmaster startup fails with critical "setup failed" logging message
- GE-5995 job is executed even if prolog fails
- GE-5999 Preempted jobs stay in P-state
- GE-6006 A negative posix priority at submission results in a very high priority value in report
- GE-6008 dbwriter installation installs incorrect database version 14 instead of 15
- GE-6009 dbwriter cannot parse accounting record with io operations
- GE-6010 upgrade script does not recognize patch releases, e.g. 8.3.1p9
- GE-6012 Syntax error in installer script causes wrong error message during install

#### Univa Grid Engine 8.4.1

- GE-4293 qsub -w e -l exclusive=true rejects job, even if the request is valid
- GE-5850 allow to specify more Docker properties when submitting a job
- GE-6016 submitting job dependencies and deleting them again can trigger huge amount of qmaster mem usage
- GE-6028 User/group management done via Windows Active Domain might break UGE
- GE-6030 Introduce possibility to switch of commlib's internal hostname cache
- GE-6031 on native Windows (win-x86), the shepherd of running jobs can produce huge trace files if the UGE job starter service ends the connection unexpectedly
- GE-6036 job loss on exed restart after host\_aliases changes
- GE-6039 clients report "failed to extract authentication information" error
- GE-6042 Scheduling run might take longer than with previous versions of UGE
- GE-6052 cwd is not mapped into docker container bind

## 4 Upgrade Notes

### 4.1 Upgrade Requirements

This is a summary of the Upgrade Matrix that describes how you can carry out the transition from Sun or Oracle Grid Engine 6.2uX, Univa Grid Engine 8.0.X, 8.1.X, 8.2.X, 8.3.X to Univa Grid Engine 8.4 when you are currently using classic, BDB local spooling or PostgreSQL spooling. If the current version of Grid Engine you are using is missing in the overview, then please look at the full Upgrade Matrix located in the section Updating Univa Grid Engine in the Installation Guide.

Version	Upgrade Method
Univa Grid Engine 8.3.X	Backup/Restore
Univa Grid Engine 8.2.X	Backup/Restore
Univa Grid Engine 8.1.X	Backup/Restore
Univa Grid Engine 8.0.X	Backup/Restore
Oracle Grid Engine 6.2u6-6.2u8	Backup/Restore
Sun Grid Engine 6.2u5	Backup/Restore
Sun Grid Engine 6.2u1-6.2u4	Upgrade to SGE 6.2u5 and then Backup/Restore
Sun Grid Engine 6.2 FCS	Upgrade to SGE 6.2u5 and then Backup/Restore

Table 2: Upgrading from SGE, OGE, UGE 8.1.X, UGE 8.2.X to Univa Grid Engine 8.3.X

Upgrading to Univa Grid Engine requires a drained cluster, which means: No pending, running, ... jobs are allowed.

## 5 **Compatibility Notes**

## 6 **Known Issues and Limitations**