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Rev: August 2014
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:

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

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 a 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 >= 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-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 redist 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 'O' 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'
3 Fixes and Enhancements

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 if 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  quota "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

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3 Fixes and Enhancements

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
3  Fixes and Enhancements

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  qhost 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 to reconnect

GE-5766 bind lists of UGE directories properly into the Docker container

GE-5780 update openssl library to current version 1.0.2

GE-5791 exec host goes into unknown (u) state when the system time is set to an earlier time

GE-5797 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 reporting
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.

<table>
<thead>
<tr>
<th>Version</th>
<th>Upgrade Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Univa Grid Engine 8.3.X</td>
<td>Backup/Restore</td>
</tr>
<tr>
<td>Univa Grid Engine 8.2.X</td>
<td>Backup/Restore</td>
</tr>
<tr>
<td>Univa Grid Engine 8.1.X</td>
<td>Backup/Restore</td>
</tr>
<tr>
<td>Univa Grid Engine 8.0.X</td>
<td>Backup/Restore</td>
</tr>
<tr>
<td>Oracle Grid Engine 6.2u6-6.2u8</td>
<td>Backup/Restore</td>
</tr>
<tr>
<td>Sun Grid Engine 6.2u5</td>
<td>Backup/Restore</td>
</tr>
<tr>
<td>Sun Grid Engine 6.2u1-6.2u4</td>
<td>Upgrade to SGE 6.2u5 and then Backup/Restore</td>
</tr>
<tr>
<td>Sun Grid Engine 6.2 FCS</td>
<td>Upgrade to SGE 6.2u5 and then Backup/Restore</td>
</tr>
</tbody>
</table>

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