



UNIVA CORPORATION

GRID ENGINE DOCUMENTATION

Grid Engine Release Notes

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Contents

1	License	1
2	Supported Operating Systems, Versions and Architectures	6
3	Supported and tested Docker versions	7
3.1	Known Docker issues that affect Univa Grid Engine	10
4	Fixes and Enhancements	11
4.1	Summary	11
4.1.1	8.5.5: Security fixes and enhancements	11
4.1.2	8.5.5: Changed resulting “failed” job states in the accounting	11
4.1.3	8.5.0: Logging specific changes	11
4.1.4	8.5.1: Changed limit calculation	12
4.1.5	8.5.1: Improved rescheduling behaviour	12
4.1.6	8.5.1: Possibility to reduce qghost data request sizes at sge_qmaster	12
4.1.7	8.5.1: New environment variables in the job environment	12
4.1.8	8.5.1: New example script for jsv and core-binding	13
4.1.9	8.5.1: sgepasswd renewal	13
4.1.10	Performance Improvements and Memory Requirements	14
4.1.11	Standing Reservations	14
4.1.12	Policy Scheme: Consider Slots Instead of Jobs	14
4.1.13	RSMAP Enhancements	15
4.1.14	Improved Scheduler Profiling	16
4.1.15	Improved Logging	16
4.1.16	Encryption in CSP mode / sgepasswd	16
4.1.17	Online usage of running Windows jobs	16
4.1.18	Docker Related Enhancements	18
4.1.19	Host Aliasing and Resolving	19
4.1.20	Intel® Xeon Phi™ x200 (Knights Landing) integration	20
4.2	Full List of Fixes and Enhancements	21
4.2.1	Univa Grid Engine 8.5.0alpha1 (also fixed for a 8.3 or 8.4 patch release)	21
4.2.2	Univa Grid Engine 8.5.0alpha1 (also fixed for a 8.4 patch release)	24

4.2.3	Univa Grid Engine 8.5.0alpha1	27
4.2.4	Univa Grid Engine 8.5.0alpha2	29
4.2.5	Univa Grid Engine 8.5.0beta1	30
4.2.6	Univa Grid Engine 8.5.0 FCS	31
4.2.7	Univa Grid Engine 8.5.1	31
4.2.8	Univa Grid Engine 8.5.2	33
4.2.9	Univa Grid Engine 8.5.3	33
4.2.10	Univa Grid Engine 8.5.4	34
4.2.11	Univa Grid Engine 8.5.5	35
5	Upgrade Notes	36
5.1	Upgrade Requirements	36
6	Compatibility Notes	37
6.1	Changes in Output Format of Commands	37
6.2	Changes in Windows execution host sgepasswd file	38
6.3	Deprecated Functionality	39
7	Known Issues and Limitations	40
7.1	setting halftime to -1 (GE-6497) not supported in qmon	40
7.2	NOTE: Disabled SYSTEMD support	40

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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:

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 - 16.04LTS	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 Supported and tested Docker versions

In principle, Univa Grid Engine supports these Docker versions on these Linux distributions:

Linux Distribution	Docker versions
RedHat, CentOS, Debian and Ubuntu	1.12.0 to 1.13.0 and 17.03.0-ce to 17.12.0-ce
SLES and openSUSE	1.12.0 to 1.13.0 and 17.03.0-ce to 17.03.1-ce

But in the past there were not properly working Docker versions available that were withdrawn later and there were different Docker builds provided under the same version number showing a slightly different behaviour, so it is not possible to ensure Univa Grid Engine does work with all Docker versions between 1.12.0 and 17.12.0. The following table shows which Docker versions were tested on which Linux distribution. The table includes the “Git commit” ID of the Docker source code, the Go language version which was used to build Docker, the build date and - for completeness - the version of the Docker RemoteAPI. Other Docker versions either were not tested or are too broken to test successfully on them.

- Red Hat Enterprise Linux 7.4 (Maipo), Kernel 3.10.0-693.11.1.el7.x86_64

Docker Version	Git commit	Go Version	Build date	API version
1.12.0	8eab29e	go1.6.3		1.24
1.12.1	23cf638	go1.6.3		1.24
1.12.2	bb80604	go1.6.3		1.24
1.12.3	6b644ec	go1.6.3		1.24
1.12.4	1564f02	go1.6.4	Mon Dec 12 23:41:49 2016	1.24
1.12.5	7392c3b	go1.6.4	Fri Dec 16 02:23:59 2016	1.24
1.12.6	78d1802	go1.6.4	Tue Jan 10 20:20:01 2017	1.24
1.13.0	49bf474	go1.7.3	Tue Jan 17 09:55:28 2017	1.25
17.03.0-ce	3a232c8	go1.7.5	Tue Feb 28 08:10:07 2017	1.26
17.03.1-ce	c6d412e	go1.7.5	Mon Mar 27 17:05:44 2017	1.27
17.03.2-ce	f5ec1e2	go1.7.5	Tue Jun 27 02:21:36 2017	1.27
17.06.2-ce	cec0b72	go1.8.3	Tue Sep 5 20:00:25 2017	1.30
17.07.0-ce	8784753	go1.8.3	Tue Aug 29 17:43:23 2017	1.31
17.09.0-ce	afdb6d4	go1.8.3	Tue Sep 26 22:42:49 2017	1.32
17.09.1-ce	19e2cf6	go1.8.3	Thu Dec 7 22:25:03 2017	1.32

Docker Version	Git commit	Go Version	Build date	API version
17.12.0-ce	c97c6d6	go1.9.2	Wed Dec 27 20:12:46 2017	1.35

- CentOS 7, Kernel 3.10.0-693.2.2.el7_x86_64

Docker Version	Git commit	Go Version	Build date	API version
1.12.0	8eab29e	go1.6.3		1.24
1.12.1	23cf638	go1.6.3		1.24
1.12.2	bb80604	go1.6.3		1.24
1.12.3	6b644ec	go1.6.3		1.24
1.12.4	1564f02	go1.6.4	Mon Dec 12 23:41:49 2016	1.24
1.12.5	7392c3b	go1.6.4	Fri Dec 16 02:23:59 2016	1.24
1.12.6	78d1802	go1.6.4	Tue Jan 10 20:20:01 2017	1.24
1.13.0	49bf474	go1.7.3	Tue Jan 17 09:55:28 2017	1.25
17.03.0-ce	3a232c8	go1.7.5	Tue Feb 28 08:10:07 2017	1.26
17.03.1-ce	c6d412e	go1.7.5	Mon Mar 27 17:05:44 2017	1.27
17.03.2-ce	f5ec1e2	go1.7.5	Tue Jun 27 02:21:36 2017	1.27
17.06.2-ce	cec0b72	go1.8.3	Tue Sep 5 20:00:25 2017	1.30
17.07.0-ce	8784753	go1.8.3	Tue Aug 29 17:43:23 2017	1.31
17.09.0-ce	afdb6d4	go1.8.3	Tue Sep 26 22:42:49 2017	1.32
17.09.1-ce	19e2cf6	go1.8.3	Thu Dec 7 22:25:03 2017	1.32
17.12.0-ce	c97c6d6	go1.9.2	Wed Dec 27 20:12:46 2017	1.35

- Ubuntu 16.04.3 LTS, Kernel 4.4.0-103-generic x86_64

Docker Version	Git commit	Go Version	Build date	API version
1.12.0	8eab29e	go1.6.3	Thu Jul 28 22:11:10 2016	1.24
1.12.1	23cf638	go1.6.3	Thu Aug 18 05:33:38 2016	1.24
1.12.2	bb80604	go1.6.3	Tue Oct 11 18:29:41 2016	1.24
1.12.3	6b644ec	go1.6.3	Wed Oct 26 22:01:48 2016	1.24
1.12.4	1564f02	go1.6.4	Tue Dec 13 00:08:34 2016	1.24
1.12.5	7392c3b	go1.6.4	Fri Dec 16 02:42:17 2016	1.24
1.12.6	78d1802	go1.6.4	Tue Jan 10 20:38:45 2017	1.24

Docker Version	Git commit	Go Version	Build date	API version
1.13.0	49bf474	go1.7.3	Tue Jan 17 09:58:26 2017	1.25
17.03.0-ce	3a232c8	go1.7.5	Tue Feb 28 08:01:32 2017	1.26
17.03.1-ce	c6d412e	go1.7.5	Mon Mar 27 17:14:09 2017	1.27
17.03.2-ce	f5ec1e2	go1.7.5	Tue Jun 27 03:35:14 2017	1.27
17.06.2-ce	cec0b72	go1.8.3	Tue Sep 5 19:59:11 2017	1.30
17.09.0-ce	afdb6d4	go1.8.3	Tue Sep 26 22:40:56 2017	1.32
17.09.1-ce	19e2cf6	go1.8.3	Thu Dec 7 22:23:00 2017	1.32
17.12.0-ce	c97c6d6	go1.9.2	Wed Dec 27 20:09:53 2017	1.35

- Uuntu 16.10, Kernel 4.8.0-59-generic x86_64

Docker Version	Git commit	Go Version	Build date	API version
1.13.0	49bf474	go1.7.3	Tue Jan 17 10:05:19 2017	1.25
17.03.0-ce	3a232c8	go1.7.5	Tue Feb 28 08:05:01 2017	1.26
17.03.1-ce	c6d412e	go1.7.5	Mon Mar 27 17:17:43 2017	1.27
17.03.2-ce	f5ec1e2	go1.7.5	Tue Jun 27 03:59:22 2017	1.27

- Ubuntu 17.04, Kernel 4.10.0-42-generic x86_64

Docker Version	Git commit	Go Version	Build date	API version
17.06.2-ce	cec0b72	go1.8.3	Tue Sep 5 19:57:44 2017	1.30
17.09.0-ce	afdb6d4	go1.8.3	Tue Sep 26 22:41:24 2017	1.32
17.09.1-ce	19e2cf6	go1.8.3	Thu Dec 7 22:23:07 2017	1.32
17.12.0-ce	c97c6d6	go1.9.2	Wed Dec 27 20:09:19 2017	1.35

- Ubuntu 17.10, Kernel 4.13.0-19-generic x86_64

Docker Version	Git commit	Go Version	Build date	API version
17.06.2-ce	cec0b72	go1.8.3	Tue Sep 5 19:57:44 2017	1.30
17.09.0-ce	afdb6d4	go1.8.3	Tue Sep 26 22:41:24 2017	1.32
17.09.1-ce	19e2cf6	go1.8.3	Thu Dec 7 22:23:07 2017	1.32
17.12.0-ce	c97c6d6	go1.9.2	Wed Dec 27 20:09:47 2017	1.35

Docker Version	Git commit	Go Version	Build date	API version
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- openSUSE Leap 42.3, Kernel 4.4.92-31-default x86_64

Docker Version	Git commit	Go Version	Build date	API version
1.12.0	8eab29e	go1.6.3		1.24
1.12.1	23cf638	go1.6.3		1.24
1.12.2	bb80604	go1.6.3		1.24
1.12.3	6b644ec	go1.6.3		1.24
1.12.4	1564f02	go1.6.4	Mon Dec 12 23:41:28 2016	1.24
1.12.5	7392c3b	go1.6.4	Fri Dec 16 02:24:38 2016	1.24
1.12.6	78d1802	go1.6.4	Tue Jan 10 20:20:13 2017	1.24
1.13.0	49bf474	go1.7.3	Tue Jan 17 10:00:08 2017	1.25
17.03.0-ce	60ccb22	go1.7.5	Thu Feb 23 10:55:03 2017	1.26
17.03.1-ce	c6d412e	go1.7.5	Fri Mar 24 00:53:12 2017	1.27

3.1 Known Docker issues that affect Univa Grid Engine

- With Docker 17.09.0-ce and Docker 17.12.0-ce, specifying the `--oom-kill-disable` switch has no effect, neither using the `docker` command line client nor the `-xd "--oom-kill-disable"` switch of the Univa Grid Engine submit clients.

4 Fixes and Enhancements

4.1 Summary

4.1.1 8.5.5: Security fixes and enhancements

Univa Grid Engine contains security fixes GE-6972, GE-6973 and GE-6974. These fixes ensure that the vulnerabilities CVE-2012-0523 and CVE-2012-0208 which were reported for Oracle Gridengine are also fully integrated into Univa Grid Engine. The description of the vulnerabilities can be found at: <https://nvd.nist.gov/>

One result of this enhancements is a tighter filtering for unsafe environment variables. A new `qconf` parameter was introduced that influences the filter behaviour (see also `man sge_conf(5)`, parameter `ENABLE_SUBMIT_LIB_ENV_PREFIX`).

4.1.2 8.5.5: Changed resulting “failed” job states in the accounting

The enhancements done with GE-6983 and GE-6508 have an influence on to the Univa Grid Engine job accounting:

Old failed state	New failed state	Description
100	44	enforced by <code>execd</code> process if <code>h_rt</code> limit was hit
100	45	enforced by <code>execd</code> process if <code>h_cpu</code> limit was hit (see “Restrictions” below)
100	46	enforced by <code>execd</code> process if <code>h_vmem</code> limit was hit (see “Restrictions” below)
100	47	enforced by <code>execd</code> process if <code>h_rss</code> limit was hit (see “Restrictions” below)
37	48	forced job deletion (<code>qdel -f</code>)

Restrictions: The states 45-47 (`h_cpu`, `h_vmem` and `h_rss` limit reached) will only be set if the `execd` is configured to observe the limits. This can be configured by setting the `ENFORCE_LIMITS` `execd` parameter in the configuration to “`EXECED`”. All other settings or other limit related job termination (`shell` limit, `cgroups`) will not trigger this new failed states. In such cases the previous state 100 will be reported.

A list of all failed states can be found in the `sge_diagnostics` `man` page.

4.1.3 8.5.0: Logging specific changes

If there are temporary permission problems for the configured `execd` spool directory the `sge_execd` daemon tries to open a different file for logging messages in the spooling directory area. The filename should be “`messages.nr`” where `nr` is some unique increasing number. Once the `execd` is restarted the correct file name “`messages`” is used again.

4.1.4 8.5.1: Changed limit calculation

The limit calculation for jobs was improved for Univa Grid Engine 8.5.1 and changed compared to previous versions of Univa Grid Engine. The most important changes are:

- The configured consumable type (NO, YES, JOB, HOST) will not influence any resulting limit for tight integrated parallel jobs
- Previous Univa Grid Engine version calculated limits that were too high (depending on pe and consumable settings)
- This also affects the cgroups h_vmem observation

Univa Grid Engine versions prior to 8.5.1 had limit values that were set too high for limits like “h_vmem”. As a result jobs were not terminated although they exceeded one of their limits. The limit calculation is now corrected. A detailed overview of the limit observation and how it works is described in the `sge_diagnostics(1)` man page (JOB LIMITS).

ATTENTION: If you are updating to 8.5.1 from a previous version please verify the used limit requests of your jobs. It may be necessary to change the requested limit value. If the limit is set too low or adjusted to fit the old limit calculation, jobs which were running fine may fail after installing this version.

4.1.5 8.5.1: Improved rescheduling behaviour

The new `execd_params` parameter `RESCHEDULE_ON_MISSING_EPILOG` is introduced. The default value is `true`, which causes the old behaviour. If set to `false`, the job is not rescheduled and the queue not set to error state if the configured epilog script cannot be found. Instead, Univa Grid Engine behaves as if no epilog script was configured. This parameter also applies to the `stop_proc_args` scripts of a parallel environment (also called `pe_stop` script).

4.1.6 8.5.1: Possibility to reduce qhost data request sizes at sge_qmaster

By setting the environment variable `SGE_GDI_REQUEST_REDUCE_LEVEL` it is possible to reduce the amount of data transferred from `sge_qmaster` to `qhost` clients. A detailed description can be found in the `qhost(1)` man page (ENVIRONMENTAL VARIABLES).

4.1.7 8.5.1: New environment variables in the job environment

Univa Grid Engine sets two new environment variables in the environment of the job, the prolog, `pe_start`, `pe_stop` and epilog scripts:

`SGE_RERUN_REQUESTED=<0|1|2>`

A value of 0 means there was no `-r <y|n>` request on the submit command line of the job, 1 means `-r y` was requested and 2 means `-r n` was requested.

`SGE_RERUN_JOB=<0|1>`

A value of 1 means the job will be rescheduled on error. The value is determined from the `SGE_RERUN_REQUESTED` value and the configuration value `rerun` of the queue the job runs in.

Additionally, Univa Grid Engine sets this new environment variable in the environment of the `pe_stop` and `epilog` scripts:

```
SGE_JOB_EXIT_STATUS
```

This variable is set to the exit status of the job. This is the same value that is written to the accounting to the `exit_status` field.

4.1.8 8.5.1: New example script for jsv and core-binding

A new example script that demonstrates core-binding using JSV can be found at “`$SGE_ROOT/util/resources/jsv/core_binding_jsv.sh`”

4.1.9 8.5.1: sgepasswd renewal

The upgrade and installation scripts have been updated to ensure that CSP/sgepasswd key store is backed up and is restored correctly in a clone upgrade. If you are currently using CSP or sgepasswd you need to save your configuration as user root with:

```
# $SGE_ROOT/util/upgrade_modules/save_sge_config.sh <backupdir>
```

then replace the original script in your existing installation with the new Univa Grid Engine 8.5.1 one to also ensure backup of existing sgeCA infrastructure. Now an upgrade with `inst_sge-upd -csp` will restore your backed up key store. If you create new key store by creating a new sgeCA infrastructure you will have to reencrypt an existing sgepasswd file manually with the following command as root:

```
# $SGE_ROOT/bin/<sge_arch>/sgepasswd -n \  
    /var/sgeCA/<old port number>/<old sge_cell>.backup/private/key.pem
```

The original sgepasswd file is stored as

```
# ls $SGE_ROOT/$SGE_CELL/common/sgepasswd.oldcert_backup
```

and the reencrypted file is available as

```
# ls $SGE_ROOT/$SGE_CELL/common/sgepasswd
```

Please do not repeat this process without first saving the original files otherwise you might lose your original information and need to recreate the sgepasswd file from scratch.

Please be aware that the encryption algorithm has changed in version 8.5.0. If you are upgrading from an older installation than 8.5.0 you have to first follow the steps under section: [Changes in Windows execution host sgepasswd file](#)

4.1.10 Performance Improvements and Memory Requirements

We invested quite some time to improve the performance of various Univa Grid Engine components and libraries.

As a consequence the following metrics of the cluster have been improved compared to Univa Grid Engine 8.4.4 versions of Univa Grid Engine:

- Submit rate (increased by 5-15 % depending of the jobs types and requested functionality)
- Scheduling times (reduced by 5-30 % depending on the used policies)
- Faster delivery of dispatched jobs to `sge_execd` esp. for interactive jobs
- Memory requirements for request handling (reduced by 5-10%) especially for read-only requests like `qstat`, `qhost`, ... (reduced by 5-30 %)
- Processing and response time of requests send by execution hosts (certain requests will now be handled in parallel within `qmaster`)
- Processing of clients requests like `qstat/qhost` (which results in about 30% more requests that can be handled in the same amount of time with the same memory requirements)
- Job turnaround times

This improves the overall cluster throughput as well as interactions with the Univa Grid Engine cluster.

The speedup in your cluster depends on the details of the cluster setup and on the features of Univa Grid Engine that are enabled or disabled.

4.1.11 Standing Reservations

In Univa Grid Engine the Advance Reservation feature has been extended to allow for Standing Reservations.

A Standing Reservation is a recurring Advance Reservation. Start and end times of the individual Advance Reservations are specified via a calendar, additional command line options allow for the specification of the number of reservations at a time and the behaviour in case a reservation cannot be granted.

All options available for Advance Reservations such as resource requests are also available for Standing Reservations.

See [User Guide -> Reservations](#) for details.

4.1.12 Policy Scheme: Consider Slots Instead of Jobs

Univa Grid Engine provides a configuration option where the scheduler will consider the number of slots used by running jobs and by pending jobs when calculating users and projects contribution toward their sharing goals as defined by the share tree. That is, a parallel job using 4 slots will be considered equal in terms of resource usage to 4 serial jobs. The previous share tree algorithm did not take into account slot use which meant that if a mix of parallel and serial jobs were running or queued, the number of tickets granted to pending jobs did not result in the correct run-time sharing ratios and the share tree targets were not met. For example, if two projects “a”

and “b” are configured at the same level in the share tree with equal shares, the scheduler should try to schedule jobs so that the projects get equal usage. However, if project “a” has mostly parallel jobs, it will tend to get more usage because the previous share tree algorithm treats all jobs equally. In fact, with the old algorithm, if we look at the prioritized order of pending 4-slot jobs for project “a” and pending 1-slot jobs for project “b” for a share tree with no usage, we would see the pending jobs interleaved (a b a b a b a b ...). With the new algorithm, we would see the pending jobs ordered based on their slot usage (a b b b a b b b ...), which is more likely to lead to the proper runtime sharing ratios.

The urgency_slots PE attribute will be used to determine the assumed number of slots used by a pending job with a slot range. See urgency_slots in the sge_pe(5) man page for additional information.

The old behavior (sharing based on jobs) can be configured by setting SHARE_BASED_ON_SLOTS=false (default) in the sched_conf(5) params attribute. The new behavior (sharing based on slots) can be configured by setting SHARE_BASED_ON_SLOTS=true in the sched_conf(5) params attribute. See the sched_conf(5) man page for more details.

```
$ qconf -msconf
...
params SHARE_BASED_ON_SLOTS=true
...
```

Please note that beginning with version 8.6.0 of Univa Grid Engine the default for SHARE_BASED_ON_SLOTS will be changed from false to true.

4.1.13 RSMAP Enhancements

In Univa Grid Engine it is possible to request specific Ids of a Resource Map Complex (RSMAP) via command line with the syntax used for RESTRING (see complex(5) man page for details). The following example submits a job that requests four Ids of the complex “GPU”, three Ids with the name “gpu1” or “gpu2” and one Id with the name “gpu3”.

```
qsub -l GPU=3(gpu1|gpu2)&1(gpu3) $SGE_ROOT/examples/jobs/sleeper.sh 3600
```

Depending on the host configuration and the available Ids, one possible combination of assigned Ids for this job is gpu1 gpu1 gpu2 gpu3.

A job cannot be scheduled if the scheduler cannot find enough free Ids with the requested names, even if there are enough free Ids with different names available.

It is still possible to use the RSMAP complex without the syntax enhancements introduced in Univa Grid Engine. The scheduler will then behave like in previous versions and use any free id.

Please be aware that very complicated requests may slow down the scheduler.

To make the configuration of RSMAPs easier, a shortcut has been added.

The syntax is:

```
complex_values    complex_name=amount(complex_id:amount)
```

The following example defines a complex named “GPU” with ten available Ids, five with the name “gpu1” and five with the name “gpu2”:

```
qconf -me exechost1
...
complex_values    GPU=10(gpu1:5 gpu2:5)
...
```

4.1.14 Improved Scheduler Profiling

In previous versions of Univa Grid Engine The scheduler profiling did not completely cover the scheduling main loop. This lead into some wrong or missing profiling data. Univa Grid Engine has additional diagnostics to cover the main loop. Please read the updated `sge_diagnostics(1)` man page where the scheduler profiling is described in detail.

4.1.15 Improved Logging

The `sge_diagnostics(1)` man page was introduced to provide an overview on available logging and diagnostic options. The most important changes and new options are:

- show statistics about request types in worker and reader request queues (see “MONITOR_REQUEST_QUEUES”, man page “sge_conf(5)”)
- log spooling exceeding a certain threshold (see “LOG_SPOOLING_TIME”, man page “sge_conf(5)”)
- communication errors at first startup not logged into `/tmp/execd_messages.` file
- communication specific enhancements for profiling and startup behavior (see “PROF_COMMLIB_TIME”, man page “sge_conf(5)”)
- log job verification time exceeding a certain threshold (see “LOG_JOB_VERIFICATION_TIME”, man page “sge_conf(5)”)
- log request processing exceeding a certain threshold (see “LOG_REQUEST_PROCESSING_TIME”, man page “sge_conf(5)”)

4.1.16 Encryption in CSP mode / sgepasswd

The encryption algorithm has been changed from RC4 to AES256_CBC. This affects CSP encryption and the encryption of the Windows `execd sgepasswd` file. There are no additional upgrade steps necessary for CSP mode and the steps for Windows are described below in section: [Changes in Windows execution host sgepasswd file](#)

4.1.17 Online usage of running Windows jobs

For Univa Grid Engine jobs running on Microsoft Windows, some usage values are now reported while the jobs are running. The usage values that are reported are:

`wallclock, cpu, mem, io, iops, vmem, maxvmem`

The online usage value `iow` is not reported on Microsoft Windows.

Not all Windows usage values exactly match the corresponding UNIX usage values; this list shows what Windows system value is retrieved to report the corresponding usage value:

Online usage	Corresponding Windows system value
wallclock	(current wallclock time - start wallclock time) of the job.
cpu	(kernel time + user time) of all processes in the job.
mem	integral of <code>vmem</code> over time.
io	(read bytes + write bytes + other bytes) of all processes in the job.
iops	(read operations + write operations + other operations) of all processes in the job.
vmem	private usage of all processes in the job. The private usage is documented to be the “commit charge for this process”, which is nearly the same as the virtual memory of UNIX.
maxvmem	maximum of all measured <code>vmem</code> values of the whole job.

These online usage values are printed e.g. using the command:

```
> qstat -j <job_id>
```

Additionally, for finished jobs that ran on Microsoft Windows, these usage values are accounted: `ru_wallclock`, `ru_utime`, `ru_stime`, `wallclock`, `cpu`, `mem`, `io`, `iops`, `maxvmem`

Accounting usage	Corresponding Windows system value
<code>ru_wallclock</code>	the wallclock of the whole job measured by Windows.
<code>ru_utime</code>	user time of the whole Windows Job object that contains all processes of the job.
<code>ru_stime</code>	kernel time of the whole Windows Job object that contains all processes of the job.

`wallclock`, `cpu`, `mem`, `io`, `iops`, `maxvmem` are identical to the online usage values.

The accounting values for finished jobs are printed e.g. using the command:

```
> qacct -j <job_id>
```

4.1.18 Docker Related Enhancements

With Univa Grid Engine, variable placeholders are allowed in sub-options of the “-xd” option on the submit command line, `sge_request` files, job scripts, job classes and job submission verifier. These variable placeholders are resolved by corresponding elements of specific RSMAP complexes the Scheduler selects for the tasks of a job.

The format of these placeholders is:

```
placeholder := '${ complex_name '(' index ')' '}' .
```

where `complex_name` is the name of the corresponding RSMAP complex and `index` is the index of the element the scheduler selects from the RSMAP for this job, starting with 0.

E.g.:

If a resource map defines these values on a host: `gpu_map=4(0 1 2 3)`
this `qsub` command line is used:

```
# qsub -l docker,docker_images="*some_image*",gpu_map=2
  -xd "--device=/dev/gpu${gpu_map(0)}:/dev/gpu0,
      --device=/dev/gpu${gpu_map(1)}:/dev/gpu1" ...
```

and the scheduler selects the elements “1” and “3” from the resource map, the command line is resolved to

```
# qsub -l docker,docker_images="*some_image*",gpu_map=2
  -xd "--device=/dev/gpu1:/dev/gpu0,
      --device=/dev/gpu3:/dev/gpu1"...
```

which means the physical GPUs “gpu1” and “gpu3” are mapped to the virtual GPUs “gpu0” and “gpu1” inside the container and at the same time are exclusively reserved for the current job among all Univa Grid Engine jobs.

4.1.19 Host Aliasing and Resolving

Univa Grid Engine now better supports changes to the `host_aliases` file while Univa Grid Engine is running.

Periodically naming services like DNS or NIS may be updated which may result in changed hostnames, additionally administrators may update the `host_aliases` file. Both of these situations result in changes to the host name resolution in Univa Grid Engine. Univa Grid Engine has been enhanced to handle the following situations:

Adding `host_aliases` while Univa Grid Engine is running: Adding new entries to the `host_aliases` file is supported while Univa Grid Engine is running if the resulting name and none of the mapped hostnames is referenced in any Univa Grid Engine configuration. Host names that are changed or added which are referenced in any Univa Grid Engine configuration object will be ignored and a message will be logged in the `qmaster` messages file.

Update of internal name resolution database on daemon startup: At startup of the `qmaster` daemon any change of a hostname in the configuration will be detected and the name resolution database will be adjusted to reflect this change. If the name resolution change affects the execution daemon nodes they must be restarted by the Administrator.

Additional Improvements: Improved several places (e.g. plain hostnames used in regular expressions, hostnames reported by loadsensors) where hostnames are entering the system. This resulted in not scheduleable jobs and other problems in the past. The final Univa Grid Engine version will get an updated `host_aliases` man page and an updated admin guide (GE-6013).

4.1.20 Intel® Xeon Phi™ x200 (Knights Landing) integration

Univa Grid Engine provides an integration for Intel® Xeon Phi™ x200 (Knights Landing) Processors. The pre-compiled load-sensor automatically detects the current Cluster and also the current Memory Mode of the x200 machine. Furthermore the current MCDRAM distribution gets reported.

Please see “Configure and Install Intel Xeon Phi x200 (Knights Landing) Processors support” in the AdminsGuideGE for details.

4.2 Full List of Fixes and Enhancements

4.2.1 Univa Grid Engine 8.5.0alpha1 (also fixed for a 8.3 or 8.4 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-4229 Reduce executable sizes by removing extra symbols
- GE-4288 Confusing message on h_rt or s_rt limit
- 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-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-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-5289 add a note about the msvc redistrib dll to the installation guide
- GE-5332 DRMAA2 job template needs to support a native specification replacement
- 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-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 qpings.exe for win-x86
- 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-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 transfered to LO
- GE-5726 licence_constraints in UGE clusters are not updated
- 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-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-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-5892 RQS limits with Job Classes do not work when max_reservation > 0
- 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-5925 wrong qdel message when a job is already in deletion

GE-5933 PE jobs with start/stop procedure or jobs with prolog/epilog requesting a pty change ownership of /dev/null to job user

GE-5978 performance regression when using DRMAA2 monitoring session

GE-5981 add memory usage values as extensions in DRMAA2 job info

GE-5993 qmaster segfaults when deleting jobs with non-existing LO licenses

GE-6030 possibility to switch off 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-6097 log request processing exceeding a certain threshold

GE-6111 sge_qmaster crashes when deleting an advance reservation with a partially finished array job

GE-6152 log spooling exceeding a certain threshold

GE-6167 add new scheduler profiling line for wait times

GE-6172 jdrmaa2 openJobSession implementation is missing

GE-6174 qmaster crashes with: ->|C|!!!!!!!!!!!! QU_qname not found in element !!!!!!!!!!!!!, host is removed from queue

GE-6176 qdel -f prints unexpected messages, e.g. debug information

GE-6221 sge_qmaster might crash with specific logging settings

GE-6230 Null DRMAA2 Native Specifications Fields Can Cause Segfaults

UWSA-164 advance reservations does not contain the start time

UWSA-165 creation of an AR results in a wrong duration error

UWSA-175 support CUDA load_sensor values in resourceNumericValues

4.2.2 Univa Grid Engine 8.5.0alpha1 (also fixed for a 8.4 patch release)

GE-3146 resource reservation is broken with SGE calendar

GE-3227 AR shouldn't be scheduled to already disabled queues at time of submission

GE-4158 Some of the job class attributes are incorrect in man page and users guide

GE-4293 qsub -w e -l exclusive=true rejects job, even if the request is valid

GE-4425 SGE_LONG_QNAMES=-1 lead to qstat segfault

GE-4497 PE job is not scheduled when a non-requestable consumable is setup in global host

GE-4603 Job <jid> cannot run in PE <pe_name> because it only offers 0 slots

GE-4672 default_jc and enforce_jc are not documented in the man page

GE-4908 native Windows (win-x86) UGE binaries can't find the SGE_ROOT directory if it is the root directory of a share

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-5345 UGE to auto resolve host_aliases
- GE-5492 cuda loadsensor bash script compatibility issue
- GE-5509 host_aliases not working for resource hostname OR request
- GE-5510 host_aliases not working for qconf -purge request
- GE-5524 newline in job submission breaks reporting/accounting lines and qstat -j
- GE-5528 hostname resolving changes should trigger update of all affected data objects at qmaster/execd daemon startup
- GE-5547 The install_cuda_complexes.sh doesn't handle '\n' correctly
- GE-5577 Server side JSV parameters l_hard, l_soft and masterl contains job class access specifier
- GE-5579 Cray XC integration needs to support multiple Crays in a cluster out-of-the box
- GE-5589 changes to host_aliases file should be updated when hosts are re-resolved
- GE-5604 install_cuda_complexes.sh produces invalid complex
- GE-5635 multiple occurrences of same resource in RSMAP is not working
- 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-5675 Fully integrate Univa Grid Engine with systemd
- 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-5717 basic environment check during startup of Grid Engine daemons
- 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-5774 enable execution of tasks of parallel jobs in Docker containers
- 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 excd restart
- GE-5795 exit dispatching loop immediately when shutdown of scheduler thread is triggered
- GE-5821 remove basic Docker integration that uses load sensor and starter_method when real Docker integration works
- GE-5834 bad performance of RQS rules on host groups
- GE-5849 new masterl switch s_rss limit setting is enforced for slave

- tasks
- 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-5901 allow Docker containers to automatically start the application configured in the Docker image
 - 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-5955 host_aliases not working for sge_shadowd
 - GE-5962 the Docker daemon doesn't download an image when its not available locally
 - GE-5989 jobs are not started in Docker containers if the job user has insufficient permissions to write docker specific files
 - 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-6022 native Windows (win-x86) execution daemon installer unnecessarily needs sgepasswd file
 - GE-6023 native Windows (win-x86) submit clients need private keys of sgepasswd file
 - GE-6028 User/group management done via Windows Active Domain might break UGE
 - 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-6045 on native Windows (win-x86), the win_getpwnam_r() always tries to load the user profile, even if called with insufficient permissions
 - GE-6046 infinite loop writing to trace file in docker container
 - GE-6049 default job class is not used correctly
 - GE-6056 Cray XC integration needs to set unlimited timeout for epilog for newer UGE version
 - GE-6059 job gets rescheduled when epilog gets a SIGABRT signal
 - GE-6064 on native Windows (win-x86), error handling of (Un)LoadUserProfile() overwrites real error message
 - GE-6067 adding a queue with calendar generates error messages and no jobs will be scheduled into this queue
 - GE-6068 Interactive Docker jobs fail because sge_container_shepherd doesn't have the permission to "write the shepherd_about_to_exit" file
 - GE-6073 qsub does not support multiple use of "-binding" or "-t" parameters
 - GE-6076 on native Windows (win-x86), all job spool directories are deleted when the first job on an execution host finishes
 - GE-6087 error message complains about missing Qmaster port when Execd port is missing
 - GE-6095 log job verification time exceeding a certain threshold
 - GE-6098 RC script fails to install when the OS is using LSB
 - GE-6099 RC script not being uninstalled when update-rc.d is used as RCFILE
 - GE-6100 the name of the named pipe between UGE Job Starter Service and

- SGE_Starter.exe is not always unique
- GE-6109 dbwriter log is showing invalid integer value for a_ioops field
 - GE-6112 ar_attr and ar_log records in reporting have incorrect record time
 - GE-6113 the SGE_Starter on win-x86 logs always, even if /log was not specified
 - GE-6117 dbwriter / arcodb - error parsing the reporting file using MySQL backend
 - GE-6118 the UGE Job Starter service on native Windows (win-x86) sometimes crashes when starting qrsh with command jobs
 - GE-6126 submitting a docker autostart job fails if no job name is given
 - GE-6148 uge_js_service.exe crashes on native Windows (win-x86) if the slave task of a tightly integrated parallel job finishes
 - GE-6149 it is not possible to submit the slave task of a tightly parallel job from native Windows (win-x86)
 - GE-6156 execd crashes when a docker job is submitted, requesting memory resources
 - GE-6163 errors for sge_mirror_process_events() result in scheduler inactivity until it times out after 600 seconds
 - GE-6173 Description of certain states for qstat -s is missing in help output and man page
 - GE-6181 automated install still using systemd initscript even when it is turned off in the config file
 - GE-6185 job start fails when Docker daemon is busy
 - GE-6186 the sge_container_shepherd fails to distinguish between yet unhandled IJS control messages and container related messages
 - GE-6188 Windows (win-x86) interactive uninstaller should default to remove the services
 - GE-6193 mirror interface reports unexpected error "callback function ("callback_default") for event MOD QUEUE INSTANCE failed
 - GE-6195 startup scripts are being installed during the automated install even if ADD_TO_RC=false
 - GE-6200 child shepherd of builtin interactive job waits infinitely for mutex in shepherd_trace()
 - GE-6203 communication to Docker daemons built with Go (golang) > 1.6 does not work
 - GE-6211 the provided Docker container name is overwritten by automatically generated one
 - GE-6219 missing l10n for INFO message plus wrong newline character at the end of message
 - GE-6262 broken sge_usleep() could cause very long sleeps
 - GE-6168 sgepasswd issues

4.2.3 Univa Grid Engine 8.5.0alpha1

- GE-575 Parallel jobs exceeding wall clock time are not killed
- GE-3909 job submitted with user not on every execd node is stuck in zombie state
- GE-4991 loading dynamic libraries fails if uid != euid
- GE-5317 remove "verify_suitable_queues" from qstat -j output

- GE-5505 Job that is restarted and that was in certain error states previously stays in t-state
- GE-5540 GE-5949 drmaa does not provide the submit_cmd line
- GE-5560 Java Binding for DRMAA2
- GE-5583 enhance RSMAP so that necessity of OR requests in command line can be avoided
- GE-5600 Windows (win-x86) queue instance is set to error state if job can't be executed
- GE-5608 Atomically Delete Jobs by State
- GE-5648 cleanup and speed-up execd job start when using additional group ids
- GE-5651 Unify behavior of UGE calls that trigger library functions depending on directory services (NIS, LDAP, Active Directory, ...)
- GE-5657 Enhance RSMAP so that only elements / instances with the same name within a RSMAP are chosen.
- GE-5658 Enhance RSMAP so that instances can be requested via REGEX
- GE-5659 Allowing to configure RSMAP that the above OR is restricted only to one type.
- GE-5660 Allow shortcut for RSMAP definition
- GE-5661 Allow load sensor to restrict RSMAP
- GE-5668 Posix priority 0 not anymore scaled to 0.5
- GE-5696 add xd switch to job classes
- GE-5721 improve and reduce qhold/qrls messages and logging
- GE-5855 skip pending read-only requests where clients are already gone
- GE-5856 replace 'old' execd reports in the list of pending worker requests
- GE-5875 functionality missing that allows to filter thread specific debug outputs of components
- GE-5899 AR accepts jobs after cleanup of running jobs before end of AR
- GE-5957 jobs submitted with qsub -sync are not killed when Ctrl+C is pressed
- GE-5985 sharetree algorithm should consider slots, not jobs
- GE-6015 It takes 2 load_reports_intervals to get load_values when a new load_sensor is setup
- GE-6054 docker jobs started with qrsh have incorrect environment (SGE_ROOT, ...)
- GE-6075 Improved scheduler performance due to CULL performance improvement of all lGet/lSet functions
- GE-6088 make sure AR and SR are correctly written to the reporting file
- GE-6096 improve and reduce qdel messages/logging
- GE-6110 Reduce communication overhead by optimizing communication layer
- GE-6120 sge_execd reports "can't resolve hostname "_sge_pseudo_host" in messages file
- GE-6128 update openssl to 1.0.2j
- GE-6134 qmaster receives empty report lists that qmaster tries to process.
- GE-6136 Lock handling done in qmaster for reports send by execd might cause slowdown of qmaster
- GE-6138 Reports from execd's are always send in groups. Qmaster uses the same lock for all.
- GE-6139 Introduce possibility to set job report flush time @ execd

- GE-6142 All read-only-requests from execd's will be executed by worker threads
- GE-6162 qmaster crashes at startup when a SR with a multi time calendar is spooled
- GE-6169 Improve performance of packing operations and reduce size of objects within packbuffers
- GE-6232 reporting of job end is delayed up to one second in sge_execd
- GE-6241 update jemalloc to version 4.3.1
- GE-6242 reduce the number of events subscribed by scheduler
- GE-6250 speed up delivery of scheduler job start orders
- GE-6266 -clearp switch not available for xd-attribute of job
- GE-6267 -mods does not work correctly with rou-attribute
- GE-6268 rou-attribute of JC is not tagged as list attribute in man page
- GE-6269 XML output might be incorrect for JB_mail_list depending on the API or submit client that was used to submit the jobs
- GE-6153 use stronger cipher for CSP mode communication and sgepasswd file encryption

4.2.4 Univa Grid Engine 8.5.0alpha2

- GE-3060 in order to connect through a firewall, qrsh/qlogin should use only specified port numbers
- GE-3341 pe_min value is not correct in JSV if multiple slots ranges are requested
- GE-3928 Document and/or change default shell for qsub '-b y'
- GE-5631 -mods/-clears does not work for masterl
- GE-5632 -adds/-mods/-clears for "masterl" not described in qsub man page
- GE-5906 possible endless loop in test_drmaa2 -> test_job_wait_all
- GE-5980 getInfo() does always return a null
- GE-5997 allow to specify placeholders for Scheduler selected values in the argument list to the -xd option
- GE-6000 Have UGE documentation available in HTML format.
- GE-6026 Documentation for job name starting with a digit needs to be corrected
- GE-6027 scheduler thread repeats logging of cluster configuration
- GE-6131 update postgres library to version 9.6
- GE-6145 qsub client crashes with specific sge_request file
- GE-6153 use stronger cipher for CSP mode communication and sgepasswd file encryption
- GE-6154 Configuration API needs to be part of the regular package build
- GE-6164 qmaster, execd and scheduler params should be in upper case letters in man page and documentation
- GE-6165 log a warning when qmaster reads unknown cluster config parameters
- GE-6166 log a warning when qmaster and execd read unknown *_params
- GE-6168 sgepasswd issues
- GE-6170 qsub_time is set to a time at year 1970, in case of job error
- GE-6192 reduce spooling operations for a job lifecycle
- GE-6251 Rest and Config API should also support 'port_range' parameter
- GE-6283 switch and argument in xd attribute of job classes cannot be delimited by space although this is possible at command line in qsub
- GE-6289 load sensor script triggered endlessly (independent from the configured load report interval)

GE-6291 scheduler profiling does not show time spend for updating event master settings
 GE-6314 JC variant output for xd attribute missing
 GE-6317 resource bookkeeping is broken, scheduler stops dispatching large parallel jobs, qmaster getting overloaded
 GE-6323 Scheduler tries to find a master_queue for not schedulable job even if there is no master queue request
 GE-6329 changing a resource with qalter -mods fails if mem_free is part of the requested resources in the qsub command
 GE-6331 docker autostart jobs run through but exit_status is 1 and start/end time missing
 GE-6336 incorrect hostname resolving for qsub -q parameter
 GE-6337 transient builtin load values are spooled
 GE-6358 sge_execd might crash on AIX
 GE-6341 Config API should also support new job class 'xd' parameter
 GE-6345 build sol-sparc64 packages on Solaris 10 instead of Solaris 9
 GE-6352 qalter displays success message even if modification is not allowed due to job class
 GE-6353 shepherd crashes on MacOS and possibly other OS after job finishes
 GE-6357 FQDN Hostnames are limited to 63 Characters
 GE-6359 remove obsolete load sensor scripts
 UWSA-177 automatic installation is broken -> missing SGE_CELL setting
 UWSA-179 Document should mention exact file name for adjusting logging
 UWSA-183 UGERest Api crashes when masterl switch is used

4.2.5 Univa Grid Engine 8.5.0beta1

GE-4876 make the native Windows PDC report IO and memory values
 GE-4956 qmon about box contains incorrect copyright information
 GE-4967 general documentation and man pages typos and issues
 GE-5567 Only cpu, mem and io are used in calculations of share tree usage
 GE-5721 improve and reduce qhold/qrls messages and logging
 GE-5999 Preempted jobs stay in P-state
 GE-6107 add information about not properly started Docker daemon to AdminGuide
 GE-6316 rework parts of the UGE documentation
 GE-6332 docker containers are not always removed after job end
 GE-6354 Improve qalter message logging
 GE-6372 possible execd crash in Docker job handling
 GE-6374 job start fails with Docker 1.13.0
 GE-6375 job lost detection might cause severe problems in qmaster
 GE-6376 for Docker jobs, a wrong mem online and accounting usage value is reported
 GE-6381 possible handshake problems with external load sensors
 GE-6382 AAPRE cplx column is not set correctly in qmon complex dialog
 GE-6383 qmon crash when job is suspended
 GE-6387 qtcsh does not provide an error message when command should be executed on remote host but SGE_ROOT is not set

- GE-6388 unexpected CRITICAL ERROR logging in qmaster messages file
- GE-6394 wrongly, wallclock is summed up over all PE tasks if
accounting_summary=true
- GE-6395 qalter -w p does not display all schedd_job_info messages

4.2.6 Univa Grid Engine 8.5.0 FCS

- GE-4170 -help for ./inst_sge -upd
- GE-4514 Spooledit can create strange 'CONFIG:CONFIG:global' entry
- GE-4699 one cannot create CSP credentials for a user 'a', if a user
'ab' already exists
- GE-5502 modularize install and upgrade scripts
- GE-5804 far too much usage data spooled in user objects
- GE-6013 Enhance host_aliases man page and admin guide
- GE-6026 Documentation for job name starting with a digit needs to
be corrected
- GE_6216 fix memory leaks in native Windows (win-x86) execution daemon
- GE-6289 load sensor script triggered endlessly (independent from
the configured load report interval)
- GE-6291 scheduler profiling does not show time spend for updating
event master settings
- GE-6336 incorrect hostname resolving for qsub -q parameter
- GE-6341 Config API should also support new job class 'xd' parameter
- GE-6357 FQDN Hostnames are limited to 63 Characters
- GE-6362 fix memory leaks and access issues in 8.5.0
- GE-6384 ARs oversubscribe queue slots
- GE-6397 shutdown of execd in early startup phase might take long
- GE-6398 jobs running in Docker containers write files with wrong
group ownership
- GE-6399 if the version comparison in the upgrade script doesn't find
the given version, upgrading should be stopped
- GE-6400 invalid load and memory usage reported by execd during install
- GE-6401 qmon Modify queue dialog fails with 'no default value for slots'
- GE-6405 qmon Clone queue dialog fails with "'Multiple values for one
queue domain/host..."
- GE-6409 autostarting Docker job cause the shepherd to use 100% CPU for
many seconds at job end
- GE-6411 Jobs sometimes don't get a reservation when using RQS
- UWSA-184 Expose the 'qmod -p' preemption functionality in the REST API

4.2.7 Univa Grid Engine 8.5.1

- GE-4305 Better documentation for basic share tree use case
- GE-4389 enhance qsub man page with JSV modification examples for core
binding
- GE-5650 with allocation rule \$fill_up, slave resource requests are not
obeyed when master resource and queue requests are provided
- GE-5806 parallel jobs might not startup due to wrong RQS calculations

- GE-5941 renewing certificates makes sgepasswd file unreadable
- GE-6020 allow native Windows (win-x86) functions to retry to logon users several times
- GE-6103 jobs are bound to cores even if no binding is requested
- GE-6183 sge_shepherd sets limits too high for master task
- GE-6237 jobs are being restarted even if the '-r no' was specified during submission
- GE-6402 Scheduler might not respect RQS limits during the time RQS rules are changed
- GE-6407 add documentation for config-api
- GE-6413 shepherd does not handle all error responses to a pull Docker image request
- GE-6434 incomplete binding requests shown in qstat for long lists of binding requests
- GE-6462 on native Windows (win-x86), environment variable values containing an equal sign are truncated
- GE-6467 installer fails to restart qmaster when upgrading and using SYSTEMD
- GE-6478 Very long load value of loadsensor causes segfault of execd
- GE-6480 wrong/missing error messages and wrong exit status when initializing invalid RSMAP ranges
- GE-6489 using of external loadsensors might deadlock execution daemon
- GE-6490 load sensor specific errors are not logged into execd messages file
- GE-6493 RSMAP map entry selection request does not work
- GE-6510 Core binding: striding-strategy counts needed cores wrong and rejects viable hosts
- GE-6511 gdi_request_limits does not behave as documented
- GE-6521 Qmaster crashes with LO enabled and job dependencies
- GE-6534 sge_execd crash with core dump with GPGPU jobs
- GE-6537 Submitting RSMAP-range jobs via -adds is broken
- GE-6553 RQS limits incorrectly applied when PE job submitted with "-l h=<host>"
- GE-6573 reduce resulting qhost client requested data sizes transferred via network
- GE-6575 stree-edit utility broken
- GE-6583 scheduler is wrongly skipping hosts or queue instances for parallel jobs that are using master task specific requests
- GE-6587 abort of sge_qmaster if a JC where V is set to yes is used to create a job
- UWSA-81 Add support for listening only on localhost
- UWSA-186 requested jobEnvironment is not shown in jobs
- UWSA-188 jobEnvironment ugerestsdk contains error in json converter
- UWSA-189 ugerest is showing same scheduler conf twice
- UWSA-190 upgrade of restlet-jse-2.3.6 to restlet-jse-2.3.10

4.2.8 Univa Grid Engine 8.5.2

- GE-5569 native Windows (win-x86) sge_execd exits if it cannot access the act_qmaster file
- GE-6454 improve documentation of Docker integration
- GE-6236 accounting file broken on Solaris if accounting line has 1023 characters
- GE-6615 enhance error logging if load sensor cannot be started
- GE-6618 native Windows (win-x86) execution daemon crashes if qloadsensor does not work
- GE-6620 error messages from qloadsensor.exe (win-x86) are not forwarded to the execd messages file
- GE-6623 add the UGE admin user to the Performance Monitor Users group on native Windows 10 (win-x86)
- GE-6629 qhost NSOC and NCOR incorrect on lx-arm64
- GE-6637 using hostgroups in rqs limit definition can trigger short qmaster hang at startup or rqs modify request
- GE-6640 qloadsensor.exe report "no error" if an error occurs while initializing the PDH service
- GE-6644 any epilog SIGSEGVs and sets queue in error state with execed_params INHERIT_ENV=false
- GE-6660 Requesting a RSMAP without ID can crash qmaster

4.2.9 Univa Grid Engine 8.5.3

- GE-3721 qstat -j "*" -u "user1" is not working
- GE-5290 qstat (-xml) does not accept filter switches when -j "*" is specified
- GE-6432 qdel -u "*" is only allowed to managers, not to operators
- GE-6483 document placeholders in Docker requests in the UserGuide and man pages
- GE-6497 support halftime -1 setting in scheduler config to disable past usage for sharetree
- GE-6568 Allow for forced job deletion through UGE REST
- GE-6578 Duplicate calendar entries associated with host_aliases
- GE-6595 Docker interactive job can't be deleted by qdel
- GE-6617 provide workaround in native Windows (win-x86) sgeexecd.bat script for start /b bug on Windows 10, version 10.0.15063
- GE-6664 When host aliases are configured qsub -sync y reports "commlib info: successfully updated host aliases (add: 0, del: 0)"
- GE-6670 The global configuration parameter "gdi_request_limits" not working for aliased hostnames
- GE-6671 sudo requests for same user as ugerest service user are rejected
- GE-6678 Improve accept() handling in commlib
- GE-6682 exec host cannot startup if no admin or submit host
- GE-6687 RSMAP-topology-masks jobs and -binding jobs result in wrong scheduling decisions
- GE-6695 qrstat does not output cal_depth and cal_jmp information for

- standing reservations
- GE-6696 save_sge_config.sh needs to dump advance/standing reservations for upgrade to newer versions
- GE-6697 qstat -j "*" does not support "\$user" placeholder set in sge_qstat request file
- GE-6706 unexpected logging and possibly incorrect accounting if multiple array tasks of a job are running on a host

4.2.10 Univa Grid Engine 8.5.4

- GE-5835 long scheduling times with wildcard PEs and resource reservation
- GE-5848 allow to use UGE cgroups in Docker jobs
- GE-6356 drmaa2_j_get_info does not provide full job information -> not all fields are filled
- GE-6709 huge virtual memory requirements with test DRMAA1 application
- GE-6713 shadowd on Solaris cannot start sge_qmaster
- GE-6728 sched_conf.5 man page is inaccurate regarding the PREFER_SOFT_REQUESTS scheduler param
- GE-6734 wrong scheduler info messages shown for jobs
- GE-6739 Parallel job requesting pe range not scheduled even if resources available
- GE-6741 jobs submitted into AR with RSMAP resources are not scheduled
- GE-6744 qrstat does not output queue request (-q) and immediate request (-now y)
- GE-6754 Adding new session (qconf -asi) not working on admin only host
- GE-6755 save_sge_config.sh does not dump all advance/standing reservations
- GE-6764 very long dispatching time due to RQS rule result in scheduler timeout
- GE-6771 qsub -sync stops immediately on native Windows (win-x86)
- GE-6777 huge erroneous reader thread logging at calendar state transition
- GE-6782 qstat -njd is not working as documented in the man page
- GE-6785 Supplementary groups in manager and operator lists are ignored during access validation for job deletions.
- GE-6786 false logging for 'qmaster_params': 'gdi_timeout', 'gdi_retries' and 'gdi_ping'
- GE-6787 qmaster and execd logging "invalid value (33026) for ar->op"
- GE-6788 qmaster logging about receiving older load report
- GE-6796 Calendar modification/state transition might cause repeated timed calendar events for up to one second.
- GE-6799 unexpected logging messages in sge_qmaster messages file
- GE-6812 started docker job at execd may result in sge_shepherd process eating up all memory
- GE-6814 removing non "lo_*" complex entry triggers error logging of lothread
- GE-6818 error logging: getgrgid(...) failed: Numerical result out of range
- UWSA-193 additional job usage values for execd_params ENABLE_MEM_DETAILS=1 are missing

4.2.11 Univa Grid Engine 8.5.5

- GE-6508 Accounting shows wrong fail and exit states for 'qdel -f jobID'
- GE-6835 update host configurations for changed hostnames not working if a changed hostname is matching as substring of another host
- GE-6836 improve execd reconnect behavior after qmaster shutdown and restart
- GE-6841 allow to configure the Docker daemon communication timeout
- GE-6843 Integration with latest Docker CE version(17.09)
- GE-6852 interactive Docker jobs take very long to finish if the qrsh client is killed and an epilog is configured
- GE-6853 Sometimes not able to delete pending job if docker device-mapping is used
- GE-6855 sge_qmaster abort() with critical logging "got NULL element for RUE_utilized_now"
- GE-6862 Release notes contain 'current version' also for features that were introduced with FCS
- GE-6869 arch script does not support Mac OS X High Sierra
- GE-6874 normal docker job required no_root_quash if execd spooling directory shared via nfs
- GE-6901 "messages" file can have the name ".<digit>" instead of "messages" in case of file creation issues
- GE-6913 expose scheduler thread ID in the qping output
- GE-6916 sge_ca script does not show output for skip install question if CA directories are already existing
- GE-6939 very long ticket calculation times for parallel array tasks
- GE-6946 Delete an array task will break the -tc <number> condition
- GE-6948 parse error message from Docker response and provide it as job error reason
- GE-6972 Problem with gridengine/kernel
- GE-6973 Problem with gridengine/kernel
- GE-6974 Problem with gridengine/kernel
- GE-6983 if job is killed by execd enforced limit the job failed state in accounting file should reflect this
- GE-6997 the native Windows (win-x86) execd should log that it cannot find or start the qloadsensor.exe
- GE-7002 test Docker integration with Docker versions up to 17.12
- GE-7008 Jobs requesting RSMAP complexes that are defined without Ids are not scheduled

5 Upgrade Notes

5.1 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.X.X to Univa Grid Engine 8.5 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.X.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 13: Upgrading from SGE, OGE, UGE 8.X.X to Univa Grid Engine 8.5.X

6 Compatibility Notes

6.1 Changes in Output Format of Commands

The output format of some commands has been changed:

- ‘qstat -xml’ output for jobs did sometimes show the mail recipient in the XML node “JB_mail_list/element/MR_user” or “JB_mail_list/mail_list/MR_user” of jobs depending on the used submit interface or submit client. Now it will always be: “JB_mail_list/element/MR_user”. (see GE-6269)
- ‘qstat -j’ output showed an Univa Grid Engine internally used parameter with the name ‘verify_suitable_queues’. This line of output is not shown anymore. (see GE-5317)
- ‘qstat -j’ might show additional online usage values compared to previous versions of UGE. Depending on the architecture of the underlying execution node of a job following values might be reported additionally in the ‘usage’ line: ioops (number of io operations), iow (io waiting time). (see GE-4296)
- If resource requests of jobs contained newline-characters then they were also shown in the ‘qstat -j’ output. This issue has been resolved. (see GE-5524)

6.2 Changes in Windows execution host sgepasswd file

The encryption algorithm for the “\$SGE_ROOT/\$SGE_CELL/common/sgepasswd” file passwords has been changed from RC4 to AES-256-CBC:

If you upgrade to current the version of Univa Grid Engine you need to convert your existing sgepasswd file during the upgrade procedure.

Become superuser and execute the following command on the master machine:

```
# sgepasswd -c
```

This will create a backup of your original ‘sgepasswd’ file as ‘sgepasswd.old_algorithm_backup’ and create the new compatible sgepasswd file. Otherwise encryption related error messages might show up.

If you create a new sgepasswd file from scratch no additional steps compared to previous versions are required.

6.3 Deprecated Functionality

Following components/features are deprecated and will be removed with version 8.6.0 of Univa Grid Engine:

- Graphical Installer
- qtsh

7 Known Issues and Limitations

7.1 setting halftime to -1 (GE-6497) not supported in qmon

It is recommended to use the qconf command line client.

7.2 **NOTE: Disabled SYSTEMD support**

Due to an issue with our SYSTEMD integration, we have decided to disable the integration. This means, that currently no SYSTEMD scripts will be created and installed. The legacy init scripts are still available. The related issue ID is: GE-7018

When you plan to upgrade to version 8.5.5 of Univa Grid Engine, please read this post on the Univa Support Portal:

<https://support.univa.com/hc/en-us/articles/360000264394>

It will contain detailed information about the issue, which workarounds are available and how an upgrade can be done, without issues.

In case of questions or you feel unsure on how to proceed, do not hesitate to open a support ticket or contact us via:

support@univa.com