Torque Resource Manager 6.1.0 Release Notes

Revised: 11/21/2016 See Change Log for changes.

The release notes file contains the following sections:

- New Features
- Differences
- Known Issues
- Resolved Issues
- Key Documentation Changes

New Features

This topic contains a summary of key new features in Torque Resource Manager.

6.1.0

Added Presetup Prologue for MOMs

The presetup_prologue executes before the MOMs attempt to set up jobs on the node. This prologue can be used, for example, to set up Kerberos.

Added default_gpu_mode Server Parameter

The default_gpu_mode server parameters sets the default value GPU mode. This should facilitate using CUDA 8.

Simplified Torque RPM Installation

The RPM installation no longer writes the server name into pbs_mom's config file, eliminating the need to configure the MOM config file in the default case.

Simplified Installation Process

"make install" and the package installer now install service/unit files, set up the path to the Torque libraries, and establish a shell path to binaries for sh and csh shells.

Resource Plug-In

There is now an API for creating resource plug-ins that report custom varattrs, generic resources, generic metrics, and features. Additionally, jobs can report custom resources through the plug-in.

NUMA-Aware cgroup Creation by Per Task or Per Job

A new Torque server parameter "cgroup_per_task" is available to let you specify whether cgroups are created per task or per job. The default is FALSE, meaning jobs submitted with the -L syntax will have *one* cgroup created per host; this behavior is similar to the pre-6.0 cpuset implementation.

The qsub/msub -L syntax is also modified to let you specify whether the cgroup is per task or per job at the job submission time.

> Some MPI implementations are not compatible with using one cgroup per task.

Job Arrays Now Only Partially Instantiated By Default

Job arrays are now only partially instantiated by default; additional idle jobs are added as the array is executed. This is controlled by the new idle_slot_limit

server parameter.

A new qsub -i option has also be added to set the slot limit for the job array being submitted. If set for a non-array job, it will be rejected. If the user requests an idle slot limit that exceeds the server parameter's default, the job will be rejected.

Recover Array Subjobs

The new server parameter "ghost_array_recover" is added. pbs_server will now recover array subjobs even when the array (.AR file) couldn't be recovered. This parameter is set to TRUE by default.

Improved Job Cleanup Performance (TRQ-3575)

The number of communications involved in job cleanup has been reduce, resulting in improved performance.

Epilogue Script Runs, Even if Output Files Cannot Be Appended

The epilogue script will now run when spool_as_final_name is configured, even if error and output files are not available and cannot be appended.

Cray-enabled Torque May Also Be Configured With cgroups

Cray-enabled Torque may also be configured with cgroups. On the login node, each job will have all of the CPUs and all of the memory controllers in its cgroup.

Job Script Path is an Argument to Prologue and Epilogue Scripts

A new positional parameter contains the full path of a job's job script to the job's prologue and epilogue scripts when the Torque pbs_mom "mother superior" launches the scripts. The prologue script is the new 8th positional parameter. The epilogue script is the new 11th positional parameter.

RPM Install for SLES 12

You can now use RPM to install and upgrade Torque on SLES 12.

qrun Can Interpret the -L Syntax

You can run jobs that request resources using *qrun -L* without a hostlist.

User May Request No Emails be Sent, Even on Failure

Specifying -m p at qsub time makes it so no emails are sent for the job, even on failure.

User settable kill_delay Through qsub -K Option

Added a user settable, per-job kill delay, called kill_delay. It is settable via the new qsub -K option.

Torque Commands Appear in User's Login Shell Path

RPMs created via build-torque now create /etc/profile.d/torque.sh (and torque.csh) files so that Torque commands appear in a user's login shell path.

Option to Email User on All Non-zero Exit Codes

The qsub -m f option sends an email if a job has a non-zero exit code. The qsub -m f option can be used with the a, b, and e options, but not with n or p.

Added an Option for When to Send Mail Notifications

Added a -m f option to qsub to send mail when a job terminates with a non-zero exit code.

Option to Disable Reading of RUR Information

Added $cray_check_rur configure option to disable reading of Resource Utilization Reporting (RUR) energy usage for Cray login nodes. If set to false, login MOMs will not look at the energy resource information used for each job. Disabling this may improve performance.

Improved Job Submission and Start Time Performance

Transactions per job submitted have been reduced from 11-13 to 3, improving job submission time by an average of 11-13%.

Added ghost_queue Queue Attribute

If pbs_server restarts and recovers a job but cannot find that job's queue, a new queue with the 'ghost_queue' attribute is created. That job is added and then run on the new queue. Jobs cannot be added to ghost queues. Once an administrator reviews and corrects the queue's settings, the 'ghost_queue' attribute can be removed, allowing the new queue to function normally.

New "email_batch_seconds" Server Parameter

The new server parameter "email_batch_seconds" lets you control at what frequency a batch of emails are sent to each user.

MOM Parameter to Overwrite Output Files

The $force_overwrite MOM parameter, if set to true, forces the output files to be overwritten each time a job is started.

Option to Turn Off trqauthd Logging

Added a -n option to trqauthd that disables trqauthd from logging anything.

Differences

This section contains differences in previously existing features that require a change in configuration or routine.

6.1.0

Use --enable-cgroups Recommended; --enable-cpusets is Deprecated

--enable-cgroups is the recommended configuration option. When cgroups are supported, cpusets are handled by the cgroup cpuset subsystem.

--enable-cpusets is deprecated; meaning that the functionality is still supported; however, no new features will be added.

pbs_server Does Not Shut Down When trqauthd is Stopped

The *trqauthd* service is no longer a requirement of *pbs_server*, so *pbs_server* no longer shuts down when *trqauthd* is stopped.

TorqueConfigure Script Does Not Enable the GUI Component

When the devel-tk and devel-tcl libraries have been installed, the Torqueconfiguration script does not enable the GUI component. To build the GUI component, specify --enable-gui when building from source.

Default Value for keep_completed Parameter Changed

The default value for the Torque `keep_completed` parameter has been changed to 300 seconds. The `keep_competed` parameter specifies the number of seconds jobs are kept in the job execution queue after they are completed. Keeping completed jobs in the queue enables Torque to report on the status of the jobs.

legacy_vmem Server Parameter Affects Behavior of the -l vmem Option

legacy_vmem is a new server parameter that affects the behavior of the -l vmem option. When set to true, the vmem request will be the amount of memory requested for each node of the job. When it is unset or false, vmem will be the amount of memory for the entire job and will be divided accordingly.

Queue Support for Both resources_default. and req_information_default.* Settings*

When queues have both resources_default.* and req_information_default.* set then they are applied according to their resource request type. resources_default.* settings are applied to jobs that do not explicitly use the -L syntax, while req_information_default.* settings are applied only to jobs that explicitly use the -L resource syntax.

Prohibited Mode Not Allowed for User Jobs

Setting the compute mode of an NVIDIA GPU to prohibited makes it so the GPU cannot be used at all. In previous versions of Torque users were allowed to set a GPU to prohibited mode. But then it could not set the mode to anything else since the GPU was now prohibited. This change went into effect for version 5.1.3, 6.0.2, and later.

Cray-Enabled Torque May Be Configured with cgroups

Support is added for Cray-enabled Torque configured with cgroups.

- On the login node, each job will have all of the cpus and all of the memory controllers in it's cgroup.

Support for Single Job Dependencies and Array Dependencies at the Same Time

Jobs can depend on single job dependencies and array dependencies at the same time.

Added a Way to Exclude Compute Nodes From allow_node_submit.

Set 'allow_node_submit=true' in qmgr, and then add a remote mom to node_submit_exceptions with 'set server node_submit_exceptions = <nodename>' in qmgr. This setting will disable job submissions on the <nodename> specified by the user. Previously, the process of disallowing compute nodes from submitting jobs would require making a separate entry in qmgr for each individual compute node.

Reduced the Number of Logging Statements

Reduced the number of logging statements when a node isn't up and therefore can't receive the mom hierarchy.

Added tcp_incoming_timeout Server Parameter

tcp_incoming_timeout specifies the number of seconds before incoming connections timeout. tcp_timeout now specifies the timeout for outgoing connections or connections initiated by pbs_server. tcp_incoming_timeout functions exactly the same as tcp_timeout, but governs incoming connections while tcp_timeout governs only outgoing connections (or connections initiated by pbs_server).

pbs_server Enhancement for Very Large Number of Jobs.

pbs_server has been enhanced to better handle a very large number of jobs (several hundred thousand or more) by enabling an alternate way for it to store job-related files in the directories $PBS_HOME/server_priv/jobs and $PBS_HOME/server_priv/arrays.

A new boolean server attribute, use_jobs_subdirs, lets an administrator direct the way pbs_server will store its job-related files. When use_jobs_subdirs is

unset (or set to false), job and job array files will be stored directly under $PBS_HOME/server_priv/jobs and $PBS_HOME/server_priv/arrays. This is the default behavior and the way the server has stored these files in the past. When use_job_subdirs is set to true, job and job array files will be distributed over 10 subdirectories under their respective parent directories. This method helps to keep a smaller number of files in a given directory.

If an administrator wishes to change the use_jobs_subdirs attribute from its previous value (or when setting it to true when it has not previously been set), it is highly recommended that Torque be drained of all jobs. Failing to take this action may result in the loss of existing jobs.

Known Issues

This topic lists known issues in Torque Resource Manager. Following each issue description is an associated issue number in parentheses. Known issues are aggregated and grouped by the release version for which they were first reported.

6.1.0

- qstat -f accounting logs sometimes report "resources_used.vmem=0". This is due to how Linux reports memory usage. (TRQ-3760)
- Torque will not compile when the tk-devel and tcl-devel packages are installed on the host. To work around this, disable building of the gui component by using --disable-gui when executing configure. (TRQ-3723)

Resolved Issues

Resolved issues are aggregated and grouped by the release version in which they were resolved. When applicable, each resolved issue has the associated issue number in parentheses.

6.1.0

- Systemd unit files do not correctly start/stop Torque daemons. A new -F (don't fork) switch has been added to pbs_server, pbs_mom, and trqauthd. (TRQ-3795)
- pbs_server was not starting when an array dependency was cleared before pbs_server started. (TRQ-3774)
- Torque was not waiting for a compute node to do a copy out process. (TRQ-3762)
- Fixed node locking issues that were causing pbs_server to abort when built with newer versions of the threading library. (TRQ-3755)
- Server build was failing with --disable-spool configure option. (TRQ-3751)
- Forced requeue command (qrerun -f) was not obeying kill_delay settings. (TRQ-3737)
- When adding a dynamic node, the server was initially putting the node in free state, but not reporting this state to the server. (TRQ-3733)
- The memory cgroup was not being set correctly for jobs requesting pmem and procs. (TRQ-3728)
- Jobs were not being removed from node_usage files after ending. (TRQ-3727)
- Jobs were becoming stuck after not starting correctly. (TRQ-3720)
- pbs_server aborted under ghost array recovery when job array files were missing. (TRQ-3719)
- momctl was not displaying the $varattr script or the correct time and date. (TRQ-3712) (TRQ-3617)
- pbs_mom crashed when started on the reporter node without $apbasil_protocol set in the config. (TRQ-3715)
- Torque was not allocating enough memory controllers to satisfy memory requests. (TRQ-3681)
- pbs_server was not being properly shut down when in HA mode. (TRQ-3670)
- pbs_server was not detecting and updating total_threads when a node's hyperthreading was enabled. (TRQ-3662)

- pbs_server was not properly restarted when running "service pbs_server restart" during installation. (TRQ-3657)
- Memory and swap limits were not set in cgroup. For information on how memory and swap options are used, see 1.1 -L NUMA Resource Request. (TRQ-3656)
- Jobs submitted with -l option with exclusive access to the node were not receiving all CPUs and memory controllers in the cgroup. (TRQ-3649)
- Corrected logging to only log that a signal is sent to a process when it is actually issued. (TRQ-3638)
- pmem was not getting set correctly. With cgroups enabled, pmem is the amount of resident memory allocated per process where are process is given by the value of ppn. For example: `qsub -l nodes=1:ppn=2,pmem=250mb` will allocate a total of 500 MB on the node where the job is run, 250 MB per ppn. (TRQ-3628)
- NUMA -L syntax defaulted to override user-specified parameters. (TRQ-3623)
- qstat -x returned nothing (instead of an empty XML document) when there are not jobs queued. (TRQ-3622)
- Jobs in which a task required more than one socket could not be started using NUMA -L syntax. (TRQ-3618)
- $usecp parameter was ignored when specifying which directories should be staged. (TRQ-3613)
- Server deadlocked when job_save() failed. (TRQ-3605)
- Tasks' memory usage was sometimes not reported. (TRQ-3601)
- Interactive jobs skipped submit filter directives if the first line was not #PBS. (TRQ-3585)
- Client commands were not attempting to contact the fallback server when the primary server was down. (TRQ-3582)
- Crash/infinite loop when loading certain node usage files. (TRQ-3576)
- Issue reported with alps login nodes. Updated cpusets for alps login nodes so that all of the cpus are in the job's cpuset. (TRQ-3568)
- Torque crashed intermittently when using the -L syntax. (TRQ-3566)
- Torque was not reporting nodes in the correct order. (TRQ-3559)
- Torque returned non-specific network failure messages to Moab. (TRQ-3539)
- Completed jobs were still reported in pbsnodes. (TRQ-3525)
- A deadlock occurred when handling job dependencies. (TRQ-3519)

- cgroup directories were not removed when jobs were completed. (TRQ-3515)
- drmaa unable to link with Torque. (TRQ-3511)
- Memory calculation issues reported when cgroups enabled and -l vmem|pmem|mem are used. (TRQ-3499)
- Epilogue not showing up in momctl -d3 output. (TRQ-3495)
- Job dependencies were not being cleared with High Availability server. (TRQ-3477)
- Array subjobs did not have a queued entry in the accounting log. (TRQ-3470)
- Segfault in create_alps_subnode with node_note populated. (TRQ-3445)
- Problems with clearing a node note. Removed length restriction on a node note. (TRQ-3439)
- Jobs that never ran were receiving end records. (TRQ-3432)
- Array templates were being reported as jobs. (TRQ-3405)
- A shell escape in pbs_mom's config file when specifying GRES did not show up in pbsnodes or Moab. (TRQ-3393)
- Resources_used.walltime changed to seconds from HH:MM:SS in accounting logs. (TRQ-3385)
- libtorque.so was not being created. (TRQ-3374)
- pbs_server timed out connection to pbs_mom. Added load balancing to login nodes when they start to get busy. (TRQ-3367)
- pbs_mom would hang when sending status from a child. Added a timeout for node health check scripts so that they cannot make the mom daemon hang. (TRQ-3364)
- pbs_mom hangs on restart with init script. Ensured that necessary services have been brought up before starting the Torque daemons and that the Torque daemons are shutdown before their required services are shutdown. (TRQ-3345)
- Numbered directories in server_priv/jobs (and arrays) were missing when the server attribute use_jobs_subdirs was set to TRUE. (TRQ-3185/)
- qrls gave no response and logged no problem when a failure occurred due to a slot limit restriction. (TRQ-3328)
- Fixed a memory leak when jobs were being started asynchronously. (TRQ-3326)

- qsub -W stage-in was not working. Fixed failures where the group name showed up in the log as the problem but the user did not belong to the group name given in the error. (TRQ-3312)
- Multiple moms sent invalid destroy_alps_reservation/req_delete_reservation. Only allows one kill orphaned reservation request per reservation at one time. (TRQ-3299)
- Problems building RPMs on Red Hat 6/CentOS 6 systems. (TRQ-3283)
- Jobs with square brackets in the name were aborted on restart if they weren't array subjobs. An issue was fixed with jobs getting aborted if they are named with "[]" in the name but aren't Torque array jobs. (TRQ-3214)
- Logs filled with messages about not sending hierarchy to mom. Failures are only logged the first time it can't send the hierarchy to a mom. (TRQ-3156)
- Jobs started even if mother superior could not resolve the hostname for a sister node. (TRQ-3134)
- qsig was not working correctly when display_job_server_suffix = false. (TRQ-3102)
- Error condition where the mom's port would be inserted into the .JB file name. (TRQ-3090)
- Torque was not able to release holds on job arrays. Running qrls on an array subjob allows pbs_server to correct slot limit holds for the array to which it belongs. (TRQ-3088)
- Down/offline nodes caused TORQUE to not online elastic nodes. pbs_server is now able to bring up new nodes even when there are nodes in the system that are down or offline. (TRQ-3066)
- Completed jobs were not getting cleaned up. Fixed various issues when restarting dependency jobs, including them not getting removed even after completion. (TRQ-3175)
- Several log messages were unclear. (TRQ-2860)
- qsub -v was not processing environment variables with no value correctly. (TRQ-2699)
- Node recovers when behind processing requests. pbs_server now detects when a node is failing too frequently and mark it down temporarily if this happens. Once a node is marked down, it will be marked up again if either two consecutive communications from pbs_server to the node receive successful replies, or after five minutes of staying offline (whichever comes first). A node is considered to be failing too frequently if it has three failures to reply to a server request without have two consecutive successes in between. (TRQ-2517)
- qstat -f was not displaying init_work_dir. (TRQ-2459)

- Job holds were not updated when the slot limit was changed for a job array. (TRQ-2360)
- Torque enabled unused scheduler_iteration parameter by default. (TRQ-2161)

Key Documentation Changes

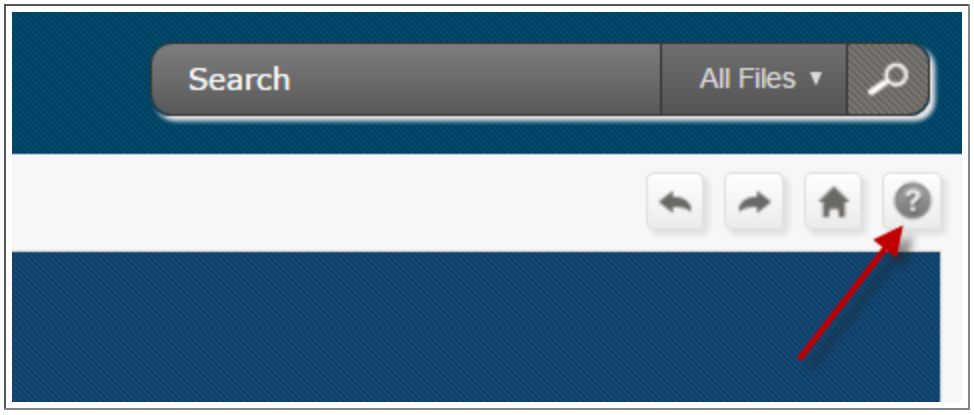
This topic lists some key documentation changes made for Torque Resource Manager 6.1.0.

Features new to this release have been documented but are not listed on this page. For information about those new features and links to their respective documentation, see New Features.

Online Help

Improvements have been made for searching the online documentation. In addition to the search filter sets added in 9.0.1, information is available on how to specify the search terms to limit the results displayed.

To access the online help, click the ? icon in the toolbar.



Change Log

This topic lists miscellaneous edits to the Release Notes. Edits are listed in descending order by revision date.

- Nov 21, 2016 – Fix typo for the Torque New Feature entry "NUMA-Aware cgroup Creation by Per Task or Per Job" to remove the incorrect text (repeating Moab JIRA ticket number) between the word "default".
- Nov 10, 2016 – Initial release notes for version 9.1.0.