torque

4.2.10

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1 Module Index

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3.1 File List

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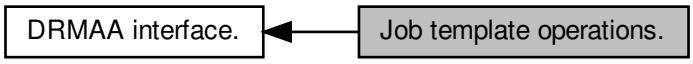
4 Module Documentation

4.1 Job template operations.

The function drmaa_allocate_job_template() SHALL allocate a new job template, returned in *jt*.

Collaboration diagram for Job template operations.:



The function drmaa_allocate_job_template() SHALL allocate a new job template, returned in *jt*.

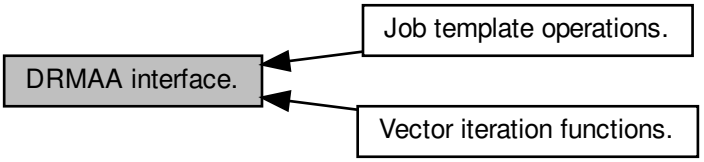
The function drmaa_set_attribute() SHALL set the value of the scalar attribute, *name*, in the job template, *jt*, to the value, *value*.

The function drmaa_delete_job_template() SHALL free the job template pointed to by *jt*.

This template is used to describe the job to be submitted. This description is accomplished by setting the desired scalar and vector attributes to their appropriate values. This template is then used in the job submission process.

4.2 DRMAA interface.

Collaboration diagram for DRMAA interface.:



Modules

- Vector iteration functions.

  The drmaa_get_next_X() functions SHALL store up to value_len bytes of the next attribute name / attribute value / job identifier from the values opaque string vector in the value buffer.
- Job template operations.

  The function drmaa_allocate_job_template() SHALL allocate a new job template, returned in jt.

Functions

- int drmaa_init (const char ∗contact, char ∗error_diagnosis, size_t error_diag_len)

  The drmaa_init() function SHALL initialize DRMAA library and create a new DRMAA session, using the contact parameter, if provided, to determine to which DRMS to connect.
- int drmaa_exit (char ∗error_diagnosis, size_t error_diag_len)

  The drmaa_exit() function SHALL disengage from DRMAA library and allow the DRMAA library to perform any necessary internal cleanup.
- int drmaa_get_attribute (drmaa_job_template_t ∗jt, const char ∗name, char ∗value, size_t value_len, char ∗error_diagnosis, size_t error_diag_len)

  The function drmaa_get_attribute() SHALL fill the value buffer with up to value_len characters of the scalar attribute, name's, value in the given job template.
- int drmaa_set_vector_attribute (drmaa_job_template_t ∗jt, const char ∗name, const char ∗value[ ], char ∗error_diagnosis, size_t error_diag_len)

  The function drmaa_set_vector_attribute() SHALL set the vector attribute, name, in the job template, jt, to the value(s), value.
- int drmaa_get_vector_attribute (drmaa_job_template_t ∗jt, const char ∗name, drmaa_attr_values_t ∗∗values, char ∗error_diagnosis, size_t error_diag_len)

  The function drmaa_get_vector_attribute() SHALL store in values an opaque values string vector containing the values of the vector attribute, name's, value in the given job template.
- int drmaa_get_attribute_names (drmaa_attr_names_t ∗∗values, char ∗error_diagnosis, size_t error_diag_↩ len)

  The function drmaa_get_attribute_names() SHALL return the set of supported scalar attribute names in an opaque names string vector stored in values.
- int drmaa_get_vector_attribute_names (drmaa_attr_names_t ∗∗values, char ∗error_diagnosis, size_t error↩ _diag_len)

  The function drmaa_get_vector_attribute_names() SHALL return the set of supported vector attribute names in an opaque names string vector stored in values.

4.2.1 Detailed Description

4.2.2 Function Documentation

4.2.2.1 drmaa_init()

```
int drmaa_init (
            const char * contact,
            char * error_diagnosis,
            size_t error_diag_len )
```

The drmaa_init() function SHALL initialize DRMAA library and create a new DRMAA session, using the contact parameter, if provided, to determine to which DRMS to connect.

This function MUST be called before any other DRMAA function, except for drmaa_get_DRM_system(), drmaa_get_DRMAA_implementation(), drmaa_get_contact(), and drmaa_strerror(). If *contact* is NULL, the default DRM system SHALL be used, provided there is only one DRMAA implementation in the provided binary module. When there is more than one DRMAA implementation in the binary module, drmaa_init() SHALL return the DRMAA_ERRNO_NO_DEFAULT_CONTACT_STRING_SELECTED error code. The drmaa_init() function SHOULD be called by only one of the threads. The main thread is RECOMMENDED. A call by another thread SHALL return the DRMAA_ERRNO_ALREADY_ACTIVE_SESSION error code.

4.2.2.2 drmaa_exit()

```
int drmaa_exit (
            char * error_diagnosis,
            size_t error_diag_len )
```

The drmaa_exit() function SHALL disengage from DRMAA library and allow the DRMAA library to perform any necessary internal cleanup.

This routine SHALL end the current DRMAA session but SHALL NOT affect any jobs (e.g, queued and running jobs SHALL remain queued and running). drmaa_exit() SHOULD be called by only one of the threads. The first call to call drmaa_exit() by a thread will operate normally. All other calls from the same and other threads SHALL fail, returning a DRMAA_ERRNO_NO_ACTIVE_SESSION error code.

4.2.2.3 drmaa_set_vector_attribute()

```
int drmaa_set_vector_attribute (
            drmaa_job_template_t * jt,
            const char * name,
            const char * value[],
            char * error_diagnosis,
            size_t error_diag_len )
```

The function drmaa_set_vector_attribute() SHALL set the vector attribute, *name*, in the job template, *jt*, to the value(s), *value*.

The DRMAA implementation MUST accept value values that are arrays of one or more strings terminated by a NULL entry.

4.2.2.4 drmaa_get_attribute_names()

```
int drmaa_get_attribute_names (
             drmaa_attr_names_t ** values,
             char * error_diagnosis,
             size_t error_diag_len )
```

The function drmaa_get_attribute_names() SHALL return the set of supported scalar attribute names in an opaque names string vector stored in *values*.

This vector SHALL include all required scalar attributes, all supported optional scalar attributes, all DRM-specific scalar attributes, and no unsupported optional attributes.

4.2.2.5 drmaa_get_vector_attribute_names()

```
int drmaa_get_vector_attribute_names (
             drmaa_attr_names_t ** values,
             char * error_diagnosis,
             size_t error_diag_len )
```

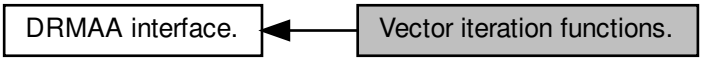
The function drmaa_get_vector_attribute_names() SHALL return the set of supported vector attribute names in an opaque names string vector stored in *values*.

This vector SHALL include all required vector attributes, all supported optional vector attributes, all DRM-specific vector attributes, and no unsupported optional attributes.

4.3 Vector iteration functions.

The drmaa_get_next_*X*() functions SHALL store up to *value_len* bytes of the next attribute name / attribute value / job identifier from the *values* opaque string vector in the *value* buffer.

Collaboration diagram for Vector iteration functions.:



The drmaa_get_next_*X*() functions SHALL store up to *value_len* bytes of the next attribute name / attribute value / job identifier from the *values* opaque string vector in the *value* buffer.

The opaque string vector's internal iterator SHALL then be moved forward to the next entry. If there are no more values those functions return DRMAA_ERRNO_INVALID_ARGUMENT (but this is outside DRMAA specification).

The drmaa_get_num_*X*() functions SHALL store the number of elements in the space provided by *size*.

The drmaa_release_*X*() functions free the memory used by the *values* opaque string vector. All memory used by strings contained therein is also freed.

4.4 Session managing function.

Functions

- int drmaa_create (drmaa_session_t **pc, const char *contact, char *errmsg, size_t errlen)

  Creates DRMAA session and opens connection with DRM.
- int drmaa_destroy (drmaa_session_t *c, char *errmsg, size_t errlen)

  Closes connection with DRM (if any) and destroys DRMAA session data.

4.4.1 Detailed Description

4.4.2 Function Documentation

4.4.2.1 drmaa_create()

```
int drmaa_create (
            drmaa_session_t ** pc,
            const char * contact,
            char * errmsg,
            size_t errlen )
```

Creates DRMAA session and opens connection with DRM.

4.4.2.2 drmaa_destroy()

```
int drmaa_destroy (
            drmaa_session_t * c,
            char * errmsg,
            size_t errlen )
```

Closes connection with DRM (if any) and destroys DRMAA session data.

4.5 Remembering submitted job in session.

Data Structures

- struct drmaa_job_s

  Job data stored for each submitted job.
- struct drmaa_job_iter_s

  Iterates over submitted jobs set.

Functions

- void drmaa_get_job_list_iter (drmaa_session_t *session, drmaa_job_iter_t *iter)

  Returns iterator to jobs held in DRMAA session.
- drmaa_job_t * drmaa_get_next_job (drmaa_job_iter_t *iter)

  Returns next job identifier from set or `NULL` if set finished.
- void drmaa_add_job (drmaa_session_t *c, drmaa_job_t *job)

  Adds job identifier to session.
- bool drmaa_find_job (drmaa_session_t *c, const char *jobid, drmaa_job_t *found, unsigned flags)

  Checks if job with given identifier exist in hash table and optionally removes it.

4.5.1 Detailed Description

4.5.2 Function Documentation

4.5.2.1 drmaa_get_job_list_iter()

```
void drmaa_get_job_list_iter (
            drmaa_session_t * session,
            drmaa_job_iter_t * iter )
```

Returns iterator to jobs held in DRMAA session.

Caller thread should have drmaa_session_s::jobs_mutex acquired iterator remains valid until job list is modified (or lock is released).

4.5.2.2 drmaa_get_next_job()

```
drmaa_job_t* drmaa_get_next_job (
            drmaa_job_iter_t * iter )
```

Returns next job identifier from set or `NULL` if set finished.

4.5.2.3 drmaa_add_job()

```
void drmaa_add_job (
            drmaa_session_t * c,
            drmaa_job_t * job )
```

Adds job identifier to session.

Parameters

c	DRMAA session.
job	Malloced drmaa_job_t structure with filled jobid field (also malloced).

4.5.2.4 drmaa_find_job()

```
bool drmaa_find_job (
            drmaa_session_t * c,
            const char * jobid,
            drmaa_job_t * found,
            unsigned flags )
```

Checks if job with given identifier exist in hash table and optionally removes it.

Parameters

c	Opened DRMAA session.
jobid	Job identifier.
found	If not `NULL` and job was found job session data will be stored here.
flags	Information to store into session. If DRMAA_JOB_DISPOSE bit is set session data will be removed.

See also

job_flag_t

5 Data Structure Documentation

5.1 drmaa_attr_names_s Struct Reference

The documentation for this struct was generated from the following file:

- src/drmaa_impl.h

5.2 drmaa_attr_values_s Struct Reference

The documentation for this struct was generated from the following file:

- src/drmaa_impl.h

5.3 drmaa_attrib Struct Reference

The documentation for this struct was generated from the following file:

- src/attrib.c

5.4 drmaa_attrib_info_s Struct Reference

The documentation for this struct was generated from the following file:

- src/attrib.h

5.5 drmaa_def_attr_s Struct Reference

The documentation for this struct was generated from the following file:

- src/submit.c

5.6 drmaa_job_ids_s Struct Reference

The documentation for this struct was generated from the following file:

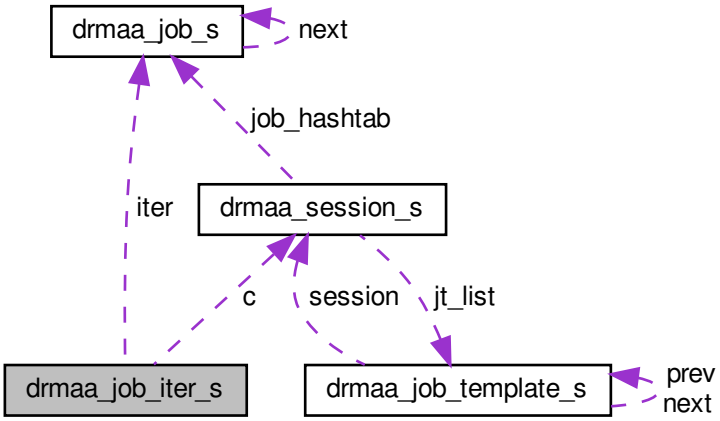
- src/drmaa_impl.h

5.7 drmaa_job_iter_s Struct Reference

Iterates over submitted jobs set.

`#include <jobs.h>`

Collaboration diagram for drmaa_job_iter_s:



Data Fields

- unsigned hash

  Hash value of job identifier.

5.7.1 Detailed Description

Iterates over submitted jobs set.

5.7.2 Field Documentation

5.7.2.1 hash

`unsigned drmaa_job_iter_s::hash`

Hash value of job identifier.

The documentation for this struct was generated from the following file:

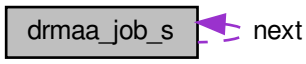
- src/jobs.h

5.8 drmaa_job_s Struct Reference

Job data stored for each submitted job.

`#include <jobs.h>`

Collaboration diagram for drmaa_job_s:



Data Fields

- drmaa_job_t * next
  Next job in list or NULL.
- char * jobid
  Job identifier from DRM.
- int time_label
  Job submission timestamp increased in DRMAA session with each submitted job.
- bool terminated
  Whether we know that job terminated and its status is waiting to rip.
- bool suspended
  Whether job was suspended within session by drmaa_control().

5.8.1 Detailed Description

Job data stored for each submitted job.

It is freed when job terminates and it's status is disposed by drmaa_wait() or drmaa_synchronize().

5.8.2 Field Documentation

5.8.2.1 next

`drmaa_job_t* drmaa_job_s::next`

Next job in list or NULL.

5.8.2.2 jobid

```
char* drmaa_job_s::jobid
```

Job identifier from DRM.

The documentation for this struct was generated from the following file:

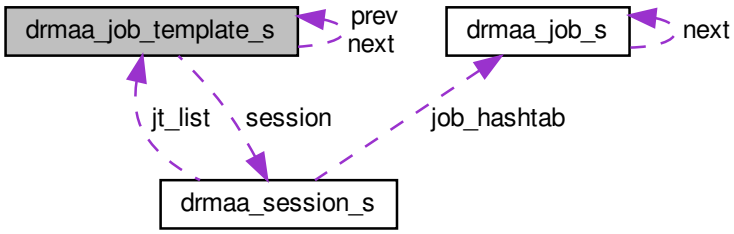
- src/jobs.h

5.9 drmaa_job_template_s Struct Reference

Job template data.

```
#include <drmaa_impl.h>
```

Collaboration diagram for drmaa_job_template_s:



Data Fields

- drmaa_session_t * session
  DRMAA session in which job template was created.
- drmaa_job_template_t * prev
  Previous job template in list.
- drmaa_job_template_t * next
  Next job template in list.
- void ** attrib
  Table of DRMAA attributes.
- pthread_mutex_t mutex
  Mutex for accessing job attributes.

5.9.1 Detailed Description

Job template data.

5.9.2 Field Documentation

5.9.2.1 session

```
drmaa_session_t* drmaa_job_template_s::session
```

DRMAA session in which job template was created.

5.9.2.2 prev

```
drmaa_job_template_t* drmaa_job_template_s::prev
```

Previous job template in list.

5.9.2.3 next

```
drmaa_job_template_t* drmaa_job_template_s::next
```

Next job template in list.

5.9.2.4 attrib

```
void** drmaa_job_template_s::attrib
```

Table of DRMAA attributes.

It is filled with N_DRMAA_ATTRIBS values which are either `NULL` (attribute not set) or string (scalar attribute) or `NULL` terminated array of strings (vector attribute).

5.9.2.5 mutex

```
pthread_mutex_t drmaa_job_template_s::mutex
```

Mutex for accessing job attributes.

The documentation for this struct was generated from the following file:

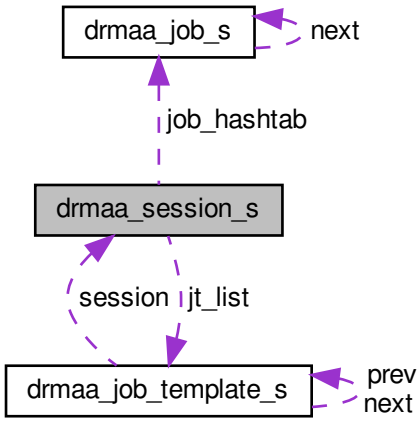
- src/drmaa_impl.h

5.10 drmaa_session_s Struct Reference

DRMAA session data.

`#include <drmaa_impl.h>`

Collaboration diagram for drmaa_session_s:



Data Fields

- int pbs_conn

  PBS connection (or -1).
- char * contact

  Contact to PBS server – 'host[:port]'.
- drmaa_job_template_t * jt_list

  Cyclic list (with sentinel) of job templates created in this DRMAA session.
- drmaa_job_t ** job_hashtab

  Hash table of jobs which have to be remembered in DRMAA session (was submitted in this session and its status was not removed).
- int next_time_label

  Will be assigned to next submitted job.
- pthread_mutex_t conn_mutex

  Mutex for PBS connection.
- pthread_mutex_t jobs_mutex

  Mutex for jt_list, #job_list and next_time_label.

5.10.1 Detailed Description

DRMAA session data.

5.10.2 Field Documentation

5.10.2.1 pbs_conn

```
int drmaa_session_s::pbs_conn
```

PBS connection (or -1).

5.10.2.2 contact

```
char* drmaa_session_s::contact
```

Contact to PBS server – 'host[:port]'.

5.10.2.3 jt_list

```
drmaa_job_template_t* drmaa_session_s::jt_list
```

Cyclic list (with sentinel) of job templates created in this DRMAA session.

5.10.2.4 job_hashtab

```
drmaa_job_t** drmaa_session_s::job_hashtab
```

Hash table of jobs which have to be remembered in DRMAA session (was submitted in this session and its status was not removed).

5.10.2.5 next_time_label

```
int drmaa_session_s::next_time_label
```

Will be assigned to next submitted job.

5.10.2.6 conn_mutex

```
pthread_mutex_t drmaa_session_s::conn_mutex
```

Mutex for PBS connection.

5.10.2.7 jobs_mutex

```
pthread_mutex_t drmaa_session_s::jobs_mutex
```

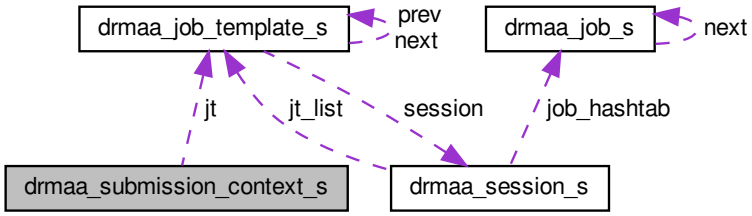
Mutex for jt_list, #job_list and next_time_label.

The documentation for this struct was generated from the following file:

- src/drmaa_impl.h

5.11 drmaa_submission_context_s Struct Reference

Collaboration diagram for drmaa_submission_context_s:



The documentation for this struct was generated from the following file:

- src/drmaa_impl.h

5.12 pbs_attrib Struct Reference

The documentation for this struct was generated from the following file:

- src/attrib.c

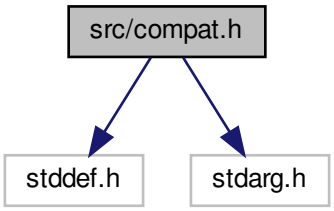
6 File Documentation

6.1 src/compat.h File Reference

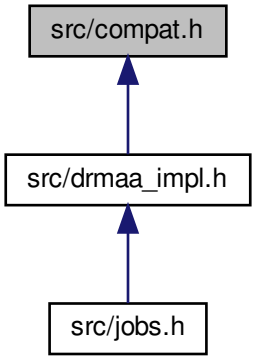
System compatibility functions.

```
#include <stddef.h>
#include <stdarg.h>
```

Include dependency graph for compat.h:



This graph shows which files directly or indirectly include this file:



6.1.1 Detailed Description

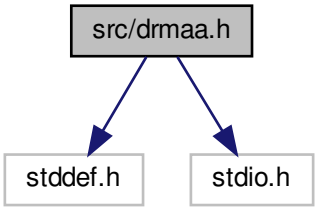
System compatibility functions.

6.2 src/drmaa.h File Reference

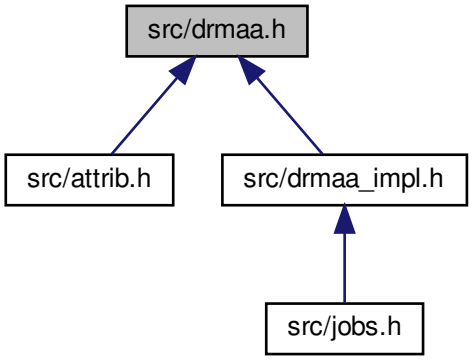
DRMAA library for Torque/PBS.

```
#include <stddef.h>
#include <stdio.h>
```

Include dependency graph for drmaa.h:



This graph shows which files directly or indirectly include this file:



Functions

- int drmaa_init (const char *contact, char *error_diagnosis, size_t error_diag_len)

  The drmaa_init() function SHALL initialize DRMAA library and create a new DRMAA session, using the contact parameter, if provided, to determine to which DRMS to connect.
- int drmaa_exit (char *error_diagnosis, size_t error_diag_len)

  The drmaa_exit() function SHALL disengage from DRMAA library and allow the DRMAA library to perform any necessary internal cleanup.
- int drmaa_get_attribute (drmaa_job_template_t *jt, const char *name, char *value, size_t value_len, char *error_diagnosis, size_t error_diag_len)

The function drmaa_get_attribute() SHALL fill the value buffer with up to value_len characters of the scalar attribute, name's, value in the given job template.

- int drmaa_set_vector_attribute (drmaa_job_template_t *jt, const char *name, const char *value[], char *error_diagnosis, size_t error_diag_len)

  The function drmaa_set_vector_attribute() SHALL set the vector attribute, name, in the job template, jt, to the value(s), value.
- int drmaa_get_vector_attribute (drmaa_job_template_t *jt, const char *name, drmaa_attr_values_t **values, char *error_diagnosis, size_t error_diag_len)

  The function drmaa_get_vector_attribute() SHALL store in values an opaque values string vector containing the values of the vector attribute, name's, value in the given job template.
- int drmaa_get_attribute_names (drmaa_attr_names_t **values, char *error_diagnosis, size_t error_diag_↩ len)

  The function drmaa_get_attribute_names() SHALL return the set of supported scalar attribute names in an opaque names string vector stored in values.
- int drmaa_get_vector_attribute_names (drmaa_attr_names_t **values, char *error_diagnosis, size_t error↩ _diag_len)

  The function drmaa_get_vector_attribute_names() SHALL return the set of supported vector attribute names in an opaque names string vector stored in values.
- int drmaa_run_job (char *job_id, size_t job_id_len, const drmaa_job_template_t *jt, char *error_diagnosis, size_t error_diag_len)

  The drmaa_run_job() function submits a single job with the attributes defined in the job template, jt.
- int drmaa_run_bulk_jobs (drmaa_job_ids_t **jobids, const drmaa_job_template_t *jt, int start, int end, int incr, char *error_diagnosis, size_t error_diag_len)

  The drmaa_run_bulk_jobs() function submits a set of parametric jobs which can be run concurrently.
- int drmaa_control (const char *job_id, int action, char *error_diagnosis, size_t error_diag_len)

  The drmaa_control() function SHALL enact the action indicated by action on the job specified by the job identifier, jobid.
- int drmaa_job_ps (const char *job_id, int *remote_ps, char *error_diagnosis, size_t error_diag_len)

  The drmaa_job_ps() function SHALL store in remote_ps the program status of the job identified by job_id.
- int drmaa_synchronize (const char *job_ids[], signed long timeout, int dispose, char *error_diagnosis, size↩ _t error_diag_len)

  The drmaa_synchronize() function SHALL cause the calling thread to block until all jobs specified by job_ids have finished execution.
- int drmaa_wait (const char *job_id, char *job_id_out, size_t job_id_out_len, int *stat, signed long timeout, drmaa_attr_values_t **rusage, char *error_diagnosis, size_t error_diag_len)

  The drmaa_wait() function SHALL wait for a job identified by job_id to finish execution or fail.
- const char * drmaa_strerror (int drmaa_errno)

  The drmaa_strerror() function SHALL return the error string describing the DRMAA error number drmaa_errno.
- int drmaa_get_contact (char *contact, size_t contact_len, char *error_diagnosis, size_t error_diag_len)

  The drmaa_get_contact() function, if called before drmaa_init(), SHALL return a string containing a comma-delimited list of default DRMAA implementation contacts strings, one per DRM implementation provided.
- int drmaa_version (unsigned int *major, unsigned int *minor, char *error_diagnosis, size_t error_diag_len)

  The drmaa_version() function SHALL set major and minor to the major and minor versions of the DRMAA C binding specification implemented by the DRMAA implementation.
- int drmaa_get_DRM_system (char *drm_system, size_t drm_system_len, char *error_diagnosis, size_↩ t error_diag_len)

  The drmaa_get_DRM_system() function, if called before drmaa_init(), SHALL return a string containing a comma-delimited list of DRM system identifiers, one per DRM system implementation provided.
- int drmaa_get_DRMAA_implementation (char *drmaa_impl, size_t drmaa_impl_len, char *error_diagnosis, size_t error_diag_len)

  The drmaa_get_DRMAA_implementation() function, if called before drmaa_init(), SHALL return a string containing a comma-delimited list of DRMAA implementations, one per DRMAA implementation provided.
- void drmaa_set_logging_output (FILE *file)

  Specify place where goes log messages from library when they were enabled at configure time.

6.2.1 Detailed Description

DRMAA library for Torque/PBS.

Author

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6.2.2 Function Documentation

6.2.2.1 drmaa_run_job()

```
int drmaa_run_job (
            char * job_id,
            size_t job_id_len,
            const drmaa_job_template_t * jt,
            char * error_diagnosis,
            size_t error_diag_len )
```

The drmaa_run_job() function submits a single job with the attributes defined in the job template, *jt*.

Upon success, up to *job_id_len* characters of the submitted job's job identifier are stored in the buffer, *job_id*.

6.2.2.2 drmaa_run_bulk_jobs()

```
int drmaa_run_bulk_jobs (
             drmaa_job_ids_t ** jobids,
             const drmaa_job_template_t * jt,
             int start,
             int end,
             int incr,
             char * error_diagnosis,
             size_t error_diag_len )
```

The drmaa_run_bulk_jobs() function submits a set of parametric jobs which can be run concurrently.

The attributes defined in the job template, *jt* are used for every parametric job in the set. Each job in the set is identical except for it's index. The first parametric job has an index equal to *start*. The next job has an index equal to *start* + *incr*, and so on. The last job has an index equal to `start + n * incr`, where `n` is equal to `(end - start) / incr`. Note that the value of the last job's index may not be equal to end if the difference between *start* and *end* is not evenly divisble by *incr*. The smallest valid value for *start* is 1. The largest valid value for *end* is 2147483647 ($2^{31}-1$). The *start* value must be less than or equal to the *end* value, and only positive index numbers are allowed. The index number can be determined by the job in an implementation specific fashion. On success, an opaque job id string vector containing job identifiers for all submitted jobs SHALL be returned into *job_ids*. The job identifiers in the opaque job id string vector can be extracted using the drmaa_get_next_job_id() function. The caller is responsible for releasing the opaque job id string vector returned into *job_ids* using the drmaa_release_job_ids() function.

6.2.2.3 drmaa_control()

```
int drmaa_control (
             const char * job_id,
             int action,
             char * error_diagnosis,
             size_t error_diag_len )
```

The drmaa_control() function SHALL enact the action indicated by *action* on the job specified by the job identifier, *jobid*.

The action parameter's value may be one of the following:

- DRMAA_CONTROL_SUSPEND
- DRMAA_CONTROL_RESUME
- DRMAA_CONTROL_HOLD
- DRMAA_CONTROL_RELEASE
- DRMAA_CONTROL_TERMINATE The drmaa_control() function SHALL return after the DRM system has acknowledged the command, not necessarily after the desired action has been performed. If *jobid* is DRM↩ AA_JOB_IDS_SESSION_ALL, this function SHALL perform the specified action on all jobs submitted during this session as of this function is called.

6.2.2.4 drmaa_job_ps()

```
int drmaa_job_ps (
             const char * job_id,
             int * remote_ps,
             char * error_diagnosis,
             size_t error_diag_len )
```

The drmaa_job_ps() function SHALL store in *remote_ps* the program status of the job identified by *job_id*.

The possible values of a program's staus are:

- DRMAA_PS_UNDETERMINED
- DRMAA_PS_QUEUED_ACTIVE
- DRMAA_PS_SYSTEM_ON_HOLD
- DRMAA_PS_USER_ON_HOLD
- DRMAA_PS_USER_SYSTEM_ON_HOLD
- DRMAA_PS_RUNNING
- DRMAA_PS_SYSTEM_SUSPENDED
- DRMAA_PS_USER_SUSPENDED
- DRMAA_PS_DONE
- DRMAA_PS_FAILED

Terminated jobs have a status of DRMAA_PS_FAILED.

6.2.2.5 drmaa_synchronize()

```
int drmaa_synchronize (
             const char * job_ids[],
             signed long timeout,
             int dispose,
             char * error_diagnosis,
             size_t error_diag_len )
```

The drmaa_synchronize() function SHALL cause the calling thread to block until all jobs specified by *job_ids* have finished execution.

If *job_ids* contains DRMAA_JOB_IDS_SESSION_ALL, then this function SHALL wait for all jobs submitted during this DRMAA session as of the point in time when drmaa_synchronize() is called. To avoid thread race conditions in multithreaded applications, the DRMAA implementation user should explicitly synchronize this call with any other job submission calls or control calls that may change the number of remote jobs.

The *timeout* parameter value indicates how many seconds to remain blocked in this call waiting for results to become available, before returning with a DRMAA_ERRNO_EXIT_TIMEOUT error code. The value, DRMAA_TIMEOUT_↩ WAIT_FOREVER, MAY be specified to wait indefinitely for a result. The value, DRMAA_TIMEOUT_NO_WAIT, MAY be specified to return immediately with a DRMAA_ERRNO_EXIT_TIMEOUT error code if no result is available. If the call exits before the timeout has elapsed, all the jobs have been waited on or there was an interrupt. The caller should check system time before and after this call in order to be sure of how much time has passed. The *dispose* parameter specifies how to treat the reaping of the remote job's internal data record, which includes a record of the job's consumption of system resources during its execution and other statistical information. If the *dispose* parameter's value is 1, the DRMAA implementation SHALL dispose of the job's data record at the end of the drmaa_synchroniize() call. If the *dispose* parameter's value is 0, the data record SHALL be left for future access via the drmaa_wait() method.

6.2.2.6 drmaa_wait()

```
int drmaa_wait (
            const char * job_id,
            char * job_id_out,
            size_t job_id_out_len,
            int * stat,
            signed long timeout,
            drmaa_attr_values_t ** rusage,
            char * error_diagnosis,
            size_t error_diag_len )
```

The drmaa_wait() function SHALL wait for a job identified by *job_id* to finish execution or fail.

If the special string, JOB_IDS_SESSION_ANY, is provided as the job_id, this function will wait for any job from the session to finish execution or fail. In this case, any job for which exit status information is available will satisfy the requirement, including jobs which preivously finished but have never been the subject of a drmaa_wait() call. This routine is modeled on the `wait3` POSIX routine.

The *timeout* parameter value indicates how many seconds to remain blocked in this call waiting for a result, before returning with a DRMAA_ERRNO_EXIT_TIMEOUT error code. The value, DRMAA_TIMEOUT_WAIT_FOREVER, MAY be specified to wait indefinitely for a result. The value, DRMAA_TIMEOUT_NO_WAIT, MAY be specified to return immediately with a DRMAA_ERRNO_EXIT_TIMEOUT error code if no result is available. If the call exits before the timeout has elapsed, the job has been successfully waited on or there was an interrupt. The caller should check system time before and after this call in order to be sure of how much time has passed.

Upon success, drmaa_wait() fills *job_id_out* with up to *job_id_out_len* characters of the waited job's id, stat with the a code that includes information about the conditions under which the job terminated, and *rusage* with an array of <name>=<value> strings that describe the amount of resources consumed by the job and are implementation defined. The *stat* parameter is further described below. The *rusage* parameter's values may be accessed via drmaa_get_next_attr_value().

The drmaa_wait() function reaps job data records on a successful call, so any subsequent calls to drmaa_wait() will fail, returning a DRMAA_ERRNO_INVALID_JOB error code, meaning that the job's data record has already been reaped. This error code is the same as if the job were unknown. If drmaa_wait() exists due to a timeout, DRMAA_ERRNO_EXIT_TIMEOUT is returned and no rusage information is reaped. (The only case where drmaa_wait() can be successfully called on a single job more than once is when the previous call(s) to drmaa_wait() returned DRMAA_ERRNO_EXIT_TIMEOUT.)

The stat parameter, set by a successful call to drmaa_wait(), is used to retrieve further input about the exit condition of the waited job, identified by job_id_out, through the following functions: drmaa_wifexited(), drmaa_wexitstatus(), drmaa_wifsignaled(), drmaa_wtermsig(),drmaa_wcoredump() and drmaa_wifaborted().

6.2.2.7 drmaa_get_contact()

```
int drmaa_get_contact (
            char * contact,
            size_t contact_len,
            char * error_diagnosis,
            size_t error_diag_len )
```

The drmaa_get_contact() function, if called before drmaa_init(), SHALL return a string containing a comma-delimited list of default DRMAA implementation contacts strings, one per DRM implementation provided.

If called after drmaa_init(), drmaa_get_contacts() SHALL return the contact string for the DRM system for which the library has been initialized.

6.2.2.8 drmaa_get_DRM_system()

```
int drmaa_get_DRM_system (
             char * drm_system,
             size_t drm_system_len,
             char * error_diagnosis,
             size_t error_diag_len )
```

The drmaa_get_DRM_system() function, if called before drmaa_init(), SHALL return a string containing a comma-delimited list of DRM system identifiers, one per DRM system implementation provided.

If called after drmaa_init(), drmaa_get_DRM_system() SHALL return the selected DRM system.

6.2.2.9 drmaa_get_DRMAA_implementation()

```
int drmaa_get_DRMAA_implementation (
             char * drmaa_impl,
             size_t drmaa_impl_len,
             char * error_diagnosis,
             size_t error_diag_len )
```

The drmaa_get_DRMAA_implementation() function, if called before drmaa_init(), SHALL return a string containing a comma-delimited list of DRMAA implementations, one per DRMAA implementation provided.

If called after drmaa_init(), drmaa_get_DRMAA_implementation() SHALL return the selected DRMAA implementation.

6.2.2.10 drmaa_set_logging_output()

```
void drmaa_set_logging_output (
             FILE * file )
```

Specify place where goes log messages from library when they were enabled at configure time.

By default they are written to standard error stream.

Parameters

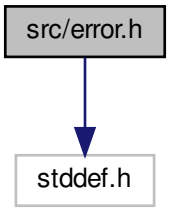
file	File to write to.

6.3 src/error.h File Reference

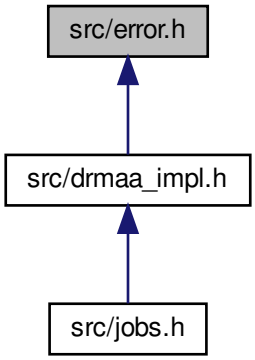
Rasing errors.

```
#include <stddef.h>
```

Include dependency graph for error.h:



This graph shows which files directly or indirectly include this file:



Functions

- int drmaa_get_errno_error (char *error_diagnosis, size_t error_diag_len)

  Gets last system error message and returns its code.
- int drmaa_get_pbs_error (char *error_diagnosis, size_t error_diag_len)

  Retrieves last PBS error message.
- int drmaa_map_pbs_error (int pbs_errcode)

  Maps PBS error code into DMRAA code.

6.3.1 Detailed Description

Rasing errors.

6.3.2 Function Documentation

6.3.2.1 drmaa_get_errno_error()

```
int drmaa_get_errno_error (
            char * error_diagnosis,
            size_t error_diag_len )
```

Gets last system error message and returns its code.

6.3.2.2 drmaa_get_pbs_error()

```
int drmaa_get_pbs_error (
            char * error_diagnosis,
            size_t error_diag_len )
```

Retrieves last PBS error message.

- no longer viable in multi-threaded torque

6.3.2.3 drmaa_map_pbs_error()

```
int drmaa_map_pbs_error (
            int pbs_errcode )
```

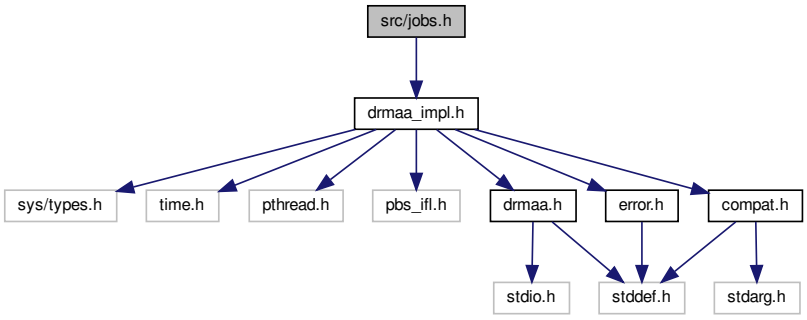
Maps PBS error code into DMRAA code.

6.4 src/jobs.h File Reference

Remembering submitted job in session.

```
#include <drmaa_impl.h>
```

Include dependency graph for jobs.h:



Data Structures

- struct drmaa_job_s

  Job data stored for each submitted job.
- struct drmaa_job_iter_s

  Iterates over submitted jobs set.

Functions

- void drmaa_get_job_list_iter (drmaa_session_t *session, drmaa_job_iter_t *iter)

  Returns iterator to jobs held in DRMAA session.
- drmaa_job_t * drmaa_get_next_job (drmaa_job_iter_t *iter)

  Returns next job identifier from set or `NULL` if set finished.
- void drmaa_add_job (drmaa_session_t *c, drmaa_job_t *job)

  Adds job identifier to session.
- bool drmaa_find_job (drmaa_session_t *c, const char *jobid, drmaa_job_t *found, unsigned flags)

  Checks if job with given identifier exist in hash table and optionally removes it.

6.4.1 Detailed Description

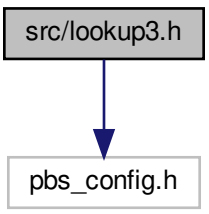
Remembering submitted job in session.

6.5 src/lookup3.h File Reference

32bit hash function implementation.

```
#include <pbs_config.h>
```

Include dependency graph for lookup3.h:



Functions

- uint32_t hashword (const uint32_t *k, size_t length, uint32_t initval)

  This works on all machines.
- uint32_t hashlittle (const void *key, size_t length, uint32_t initval)

  hashlittle() – hash a variable-length key into a 32-bit value
- uint32_t hashbig (const void *key, size_t length, uint32_t initval)

  hashbig(): This is the same as hashword() on big-endian machines.

6.5.1 Detailed Description

32bit hash function implementation.

Taken from: http://burtleburtle.net/bob/hash/

6.5.2 Function Documentation

6.5.2.1 hashword()

```
uint32_t hashword (
            const uint32 * k,
            size_t length,
            uint32 initval )
```

This works on all machines.

To be useful, it requires – that the key be an array of uint32's, and – that all your machines have the same endianness, and – that the length be the number of uint32's in the key

The function hashword() is identical to hashlittle() on little-endian machines, and identical to hashbig() on big-endian machines, except that the length has to be measured in uint32s rather than in bytes. hashlittle() is more complicated than hashword() only because hashlittle() has to dance around fitting the key bytes into registers.

Parameters

k	the key, an array of uint32 values
length	the length of the key, in uint32s
initval	the previous hash, or an arbitrary value

6.5.2.2 hashlittle()

```
uint32_t hashlittle (
            const void * key,
            size_t length,
            uint32 initval )
```

hashlittle() – hash a variable-length key into a 32-bit value

Parameters

key	the key (the unaligned variable-length array of bytes)
length	the length of the key, counting by bytes
initval	can be any 4-byte value

Returns a 32-bit value. Every bit of the key affects every bit of the return value. Two keys differing by one or two bits will have totally different hash values.

The best hash table sizes are powers of 2. There is no need to do mod a prime (mod is sooo slow!). If you need less than 32 bits, use a bitmask. For example, if you need only 10 bits, do h = (h & hashmask(10)); In which case, the hash table should have hashsize(10) elements.

If you are hashing n strings (uint8 $**$)k, do it like this: for (i=0, h=0; i$<$n; ++i) h = hashlittle(k[i], len[i], h);

By Bob Jenkins, 2006. bob_jenkins@burtleburtle.net. You may use this code any way you wish, private, educational, or commercial. It's free.

Use for hash table lookup, or anything where one collision in 2^^32 is acceptable. Do NOT use for cryptographic purposes.

6.5.2.3 hashbig()

```
uint32_t hashbig (
             const void * key,
             size_t length,
             uint32 initval )
```

hashbig(): This is the same as hashword() on big-endian machines.

It is different from hashlittle() on all machines. hashbig() takes advantage of big-endian byte ordering.

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