# Glossary

## Entities

Tractor has 5 key entities which are tracked in its database and available for inspection in the Dashboard, the tq command-line utility, and Python API.

### Job

A *job* is a logical body of work that is submitted to the system for processing. It describes what needs to get done and in which order. It can be build to be arbitrarily large and complex, from rendering a single layer of a single frame to multiple layers over a range of frames. Its can comprise of rendering, compositing, administration, and any other process that can run on a host.

### Task

A *task* is a unit of work which partially completes a job. A task can run in parallel or in series with other tasks. Tasks and their order of operation constitute the struture of a job.

### Command

A *command* is a single program that is executed on a *blade*. It can be a render, a notification script, an administration command, or any other program that can execute on the host.

### Invocation

An *invocation* is a set of metrics that describe the execution of a command on a blade. When a command runs multiple times, it will have multiple invocations to show when it ran, where it ran, and what memory and CPU resources were used.

### Blade

A *blade* is a remote execution server, a program that runs *commands* and reports the results of the command to the engine.

## Attributes

### Job Attributes

| name | type | description |
| --- | --- | --- |
| jid | integer | The Job Identifier, the unique, numerical identifier of a job. |
| owner | string | The user that submitted the job. |
| spoolhost | string | The host from which the job was submitted. |
| spoolfile | string | The path to filename of the spooled jobfile. |
| spoolcwd | string | The working directory of command that spooled the job. |
| spooladdr | ip adress | The IP address of the host that spooled the job. |
| title | string | The title of the job. |
| assignments | encoded string | These are global job variable assignments, defined in the *Assign* section of a job file. |
| dirmap | json structure | A map for translating paths according to architecture. |
| tier | string | The name of the tier. A tier is an ordered partitioning of the queue. |
| priority | float | The priority determines placement of the job in the queue. |
| crews | string list | The list of crews of the job. This will restrict the job to run on blades which are configured to accept jobs running under those crews. |
| projects | string list | a list of designations which affects how the active tasks are counted in sharing limits |

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|---|---|---|
| tags | string list | The names of the limits that will govern all commands of the job. A limit will cap the number of concurrent executions of commands tagged with the limit name. |
| service | string | The service key expression that will govern all commands of the job. The service key expression is a booean expression that allows commands to be matched with blades that have the capabilities or designation to run them. |
| envkey | string list | A list of environment key names that establish the environment in which all commands of the job will run. |
| edit policy | string | The name of the policy affecting which users can manipulate job. |
| minslots | integer | The minimum number of slots required to run a command of the job. |
| maxslots | integer | The maximum number of slots required to run a command of the job. |
| etalevel | integer | The level of job graph used to estimate remaining time to completion (unused). |
| afterjids | string | The list of ids of jobs that must finish before this job is started. |
| maxactive | integer | The maximum number of concurrent active commands allowed for this job. |
| serialsubtasks | boolean | A boolean value indicating whether subtasks are to be executed serially. |
| spooltime | timestamp | The time the job was spooled. |
| pausetime | timestamp | The time job was paused. |
| aftertime | timestamp | The time after which job will be considered for scheduling. |
| starttime | timestamp | The time job first had an active task. |
| stoptime | timestamp | The last time the job had a task that completed. |
| deletetime | timestamp | The time the job was deleted. |
| elapsedsecs | integer | The total elapsed seconds the job has been active. |
| esttotalsecs | integer | The estimated total elapsed task seconds for the job to complete. |
| numtasks | integer | The number of tasks in the job. |
| numblocked | integer | The number of blocked tasks in the job. A blocked task requires other tasks to finish before it can become ready, and later, active. |
| numready | integer | The number of ready tasks in this job. A ready task is a waiting task that does not need any other tasks to finish in order to become active. |
| numactive | integer | The number of active tasks in the job. |
| numerror | integer | The number of error tasks in the job. |
| numdone | integer | The number of done tasks in this job. |

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|---|---|---|
| max tid | integer | The highest task id of all tasks of the job, including detached ones. This is used by the engine to manage task id assignment to newly created tasks from expand tasks. Detached tasks are tasks that are not considered for scheduling because they were produced by expand tasks and the job has since been restarted. |
| max cid | integer | The highest command id of all commands of the job, including ones of detached tasks. This is used by the engine to manage command id assignement to newly created commands from expand tasks. |
| comment | string | A user-defined job comment string. |
| metadata | string | User-defined metadata of the job. |
| pil | integer | Place In Line: ordering of job relative to other jobs of same priority; initially set to the jid. |
| lastnoteid | integer | id of most recent note of job |

### Task Attributes

| name | type | description |
|---|---|---|
| jid | integer | The unique identifier of the job the task belongs to. |
| tid | integer | The Task Identifier, the unique identifier for the task within the job. |
| title | string | The title of the task. |
| id | string | The unique string id for the task within the job. |
| service | string | The service key expression that will govern all commands of the task. The service key expression is a booean expression that allows commands to be matched with blades that have the capabilities or designation to run them. |
| minslots | integer | The minimum number of slots required to run a command of the task. |
| maxslots | integer | The maximum number of slots required to run a command of the task. |
| cids | integer list | A list of command ids of the commands of the task. |
| serialsubtasks | boolean | A boolean value indicating whether subtasks are to be executed serially. |
| ptids | integer list | A list of task ids of the parent tasks. Only a task with associated Instances has multiple parents. All child tasks must successfully finish before their parent can become active. |
| attached | boolean | A boolean value which, if false, indicates the task was result of an expand task that was retried. |
| state | string | The task state. It can be blocked, ready, active, error, or done. |
| statetime | timestamp | The time the task became its current state. |
| readytime | timestamp | The time the task became ready. |
| activetime | timestamp | The time that the task became active. |
| currcid | integer | Command id of the command that will run next, or is currently running. |
| haslog | boolean | A boolean indicating whether task has output in log. |
| preview | string list | A list of command arguments (argv) of the preview command. |
| chaser | string list | A list of command arguments (argv) of the chaser command. |

| name | type | description |
| --- | --- | --- |
| progress | float | The task progress, expressed as a percentage value between 0 and 100. This is set when tasks emit ALF_PROGRESS messages. |
| metadata | string | User-defined metadata of the task. |
| resumeblock | boolean | A boolean indicating whether the task will automatically resume any resumable ancestor tasks. |
| retrycount | integer | A counter of the number of passes the task will incur if the job is left to run to completion. A task retry or job restart will increment it if the task had become active at some point. |

## Command Attributes

| name | type | description |
| --- | --- | --- |
| jid | integer | The unique identifier of the job the command belongs to. |
| tid | integer | The unique identifier of the task the command belongs to. |
| cid | integer | The Command Identifier, the unique identifier for the command within the job. |
| argv | string list | The list of command arguments representing command. |
| local | boolean | A boolean that is true if command is to be run on spooling host. |
| expand | boolean | A boolean that is true if the output of command emits script defining more tasks. |
| runtype | string | The type of command. Possible values include "normal" and "cleanup". |
| msg | string | A string value which a blade emits to a pipe to the stdin of the command. |
| service | string | The service key expression that will govern all commands of the task. The service key expression is a booean expression that allows commands to be matched with blades that have the capabilities or designation to run them. |
| tags | string list | The names of the limits that will govern all commands of the job. A limit will cap the number of concurrent executions of commands tagged with the limit name. |
| id | string | The unique string id for the task within the job. |
| refersto | string | An id of another task or command. Setting this causes the command to run on the same blade that ran the referred task or command ran on. |
| minslots | integer | The minimum number of slots required to run the command. |
| maxslots | integer | The maximum number of slots required to run the command. |
| envkey | string list | A list of environment key names that establish the environment in which the command will run. |
| retryrcodes | integer list | A list of return codes that will trigger auto-retry logic for the command. |
| metadata | string | User-defined metadata for the command. |
| resumewhile | string list | A command argument list that is executed by a blade, or a list of special keywords; either of which determine whether the command is resumable. |
| resumepin | boolean | A boolean value indicating whether the command should run on the same host when it is resumed. |
| minrunsecs | float | The minimum number of second for command to run to not be considered an error. |
| maxrunsecs | float | The maximum number of second for command to run before being killed. |

## Invocation Attributes

| name | type | description |
| --- | --- | --- |
| jid | integer | The unique identifier of the job the invocation belongs to. |
| tid | integer | The unique identifier of the task the invocation belongs to. |
| cid | integer | The unique identifier of the command the invocation belongs to. |
| iid | integer | The Invocation Identifier, the unique identifier for the invocation within the command. |
| current | boolean | A boolean value that is true if this is the most recent invocation. When a task is retried, no existing invocations will be considered current. |
| numslots | integer | The number of slots used by the invocation. |
| limits | string list | A list of limits in use by the invocation. This value is used to reconstruct the limit counters from currently running invocations should the engine be restarted. |
| starttime | timestamp | The start time of the invocation. |
| stoptime | timestamp | The stop time of the invocation. |
| pid | integer | The process id of the invocation. |
| rss | float | The resident set size of the process, in GB. |
| mem | float | The memory usage of the process, in GB. |
| cpu | float | The current CPU utilization of the process. |
| elapsedapp | float | The elapsed user time of the process, in seconds. |
| elapsedsys | float | The elapsed system time of the process, in seconds. |
| elapsedreal | float | The elapsed wall-clock time of the process, in seconds. |
| rcode | integer | The return code of the process. |
| retrycount | integer | The value of the task retry counter when he invocation ran. A task retry or job restart will increment it if the task had become active at some point. |
| resumecount | integer | A number ordering an interation by its resume pass. iteration nu of times ( the resume of the task retry counter when he invocation ran. A task retry or job restart will increment it if the task had become active at some point. |
| resumable | boolean | A boolean value that is true if the command can be resumed. |
| bladeid | id | The bladeid of the blade the invocation's command is running or ran on. |

## Blade Attributes

| name | type | description |
| --- | --- | --- |
| name | string | The blade name. It is a unique identifier of the blade, and is typically the blade's hostname. |
| ipaddr | string | The IP address of the host. |
| port | integer | The number of the port on which the blade is listening. |
| osname | string | The name of the operating system on which the blade is running. |

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|---|---|---|
| osver sion | stri ng | The version of operating system on which the blade is running. |
| bootti me | tim est amp | The boot time of the host. |
| numc pu | inte ger | The number of cpus/cores of the host. |
| loada vg | float | The CPU load average of the host. |
| avail mem ory | float | The available memory of the host, in GB. |
| avail disk | float | The availble disk space of the host, in GB. |
| versi on | stri ng | The Tractor blade version. |
| profile | stri ng | The profile name used by the blade. |
| nimby | stri ng | The NIMBY status of the blade. |
| startti me | tim est amp | The start time of the blade process. |
| nums lots | inte ger | The total number of slots on the blade. |
| udi | float | The Universal Desirability Index of the blade, which helps certain blades be assigned tasks sooner than other blades. A higher value means the higher the chance of the blade being assigned work. |
| status | stri ng | A status note for the blade. |
| heart beatti me | tim est amp | The time the blade last contacted the engine. |
| blade id | id | A universally unique identifier for a blade. Over time, attributes such as hostname, port, and IP address may be reused by different hosts. This id is used when populating invocation records so that the particular blade that ran the command can be properly identified in perpetuity. |
| cleart ime | tim est amp | The time a user requested the blade data be cleared. Only blades with a heartbeattime greater than the cleartime will be visible in the dashboard. |
| gpula bel | stri ng | Blade host GPU information. |

## Overriding Attributes

Jobs and tasks can specify attribute values that pertain to commands. These attributes are *service*, *tags*, *maxslots*, and *envkey*. Values defined at the command level override those specified at the task and job level; values defined at the task level override those specified at the job level.