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7.3 Tutorial: Creating a click counter using Kombu and celery
Contents:
1.1 Introduction

Version 2.2.10
Web http://celeryproject.org/
Download http://pypi.python.org/pypi/celery/
Source http://github.com/ask/celery/

Keywords task queue, job queue, asynchronous, rabbitmq, amqp, redis, python, webhooks, queue, distributed

Celery is an open source asynchronous task queue/job queue based on distributed message passing. It is focused on real-time operation, but supports scheduling as well.

The execution units, called tasks, are executed concurrently on one or more worker nodes using multiprocessing, Eventlet or gevent. Tasks can execute asynchronously (in the background) or synchronously (wait until ready).

Celery is used in production systems to process millions of tasks a day.

Celery is written in Python, but the protocol can be implemented in any language. It can also operate with other languages using webhooks.

The recommended message broker is RabbitMQ, but limited support for Redis, Beanstalk, MongoDB, CouchDB and databases (using SQLAlchemy or the Django ORM) is also available.

Celery is easy to integrate with Django, Pylons and Flask, using the django-celery, celery-pylons and Flask-Celery add-on packages.

- Overview
- Example
- Features
- Documentation
- Installation
  - Downloading and installing from source
  - Using the development version
1.1.1 Overview

This is a high level overview of the architecture.
The broker delivers tasks to the worker nodes. A worker node is a networked machine running celeryd. This can be one or more machines depending on the workload.
The result of the task can be stored for later retrieval (called its “tombstone”).

1.1.2 Example

You probably want to see some code by now, so here’s an example task adding two numbers:

```python
from celery.task import task

task

def add(x, y):
    return x + y

You can execute the task in the background, or wait for it to finish:

```python
>>> result = add.delay(4, 4)
>>> result.wait()  # wait for and return the result
8
```

Simple!
### 1.1.3 Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messaging</td>
<td>Supported brokers include RabbitMQ, Redis, Beanstalk, MongoDB, CouchDB, and popular SQL databases. Excellent configurable error recovery when using RabbitMQ, ensures your tasks are never lost. scenarios, and your tasks will never be lost.</td>
</tr>
<tr>
<td>Fault-tolerant</td>
<td>Runs on one or more machines. Supports broker clustering and HA when used in combination with RabbitMQ. You can set up new workers without central configuration (e.g. use your grandma’s laptop to help if the queue is temporarily congested).</td>
</tr>
<tr>
<td>Distributed</td>
<td>Concurrency is achieved by using multiprocessing, Eventlet, gevent or a mix of these.</td>
</tr>
<tr>
<td>Concurrency</td>
<td>Supports recurring tasks like cron, or specifying an exact date or countdown for when after the task should be executed.</td>
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<tr>
<td>Scheduling</td>
<td>Low latency means you are able to execute tasks while the user is waiting.</td>
</tr>
<tr>
<td>Latency</td>
<td>Task return values can be saved to the selected result store backend. You can wait for the result, retrieve it later, or ignore it.</td>
</tr>
<tr>
<td>Return Values</td>
<td>Database, MongoDB, Redis, Tokyo Tyrant, Cassandra, or AMQP (message notification). Your tasks can also be HTTP callbacks, enabling cross-language communication.</td>
</tr>
<tr>
<td>Result Stores</td>
<td>Supports rate limiting by using the token bucket algorithm, which accounts for bursts of traffic. Rate limits can be set for each task type, or globally for all. Using AMQP’s flexible routing model you can route tasks to different workers, or select different message topologies, by configuration or even at runtime.</td>
</tr>
<tr>
<td>Webshooks</td>
<td>Worker nodes can be controlled from remote by using broadcast messaging. A range of built-in commands exist in addition to the ability to easily define your own. (AMQP/Redis only)</td>
</tr>
<tr>
<td>Rate limiting</td>
<td>You can capture everything happening with the workers in real-time by subscribing to events. A real-time web monitor is in development.</td>
</tr>
<tr>
<td>Routing</td>
<td>Supports Pickle, JSON, YAML, or easily defined custom schemes. One task invocation can have a different scheme than another.</td>
</tr>
<tr>
<td>Remote-control</td>
<td>Errors and tracebacks are stored and can be investigated after the fact.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Every task has an UUID (Universally Unique Identifier), which is the task id used to query task status and return value. Tasks can be retried if they fail, with configurable maximum number of retries, and delays between each retry.</td>
</tr>
<tr>
<td>Serialization</td>
<td>A Task set is a task consisting of several sub-tasks. You can find out how many, or if all of the sub-tasks has been executed, and even retrieve the results in order. Progress bars, anyone?</td>
</tr>
<tr>
<td>Tracebacks</td>
<td>You can query status and results via URLs, enabling the ability to poll task status using Ajax. Can be configured to send e-mails to the administrators when tasks fails.</td>
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<td>UUID</td>
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<td>Retries</td>
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<td>Made for Web</td>
<td></td>
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<tr>
<td>Error E-mails</td>
<td></td>
</tr>
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</table>

### 1.1.4 Documentation

The latest documentation with user guides, tutorials and API reference is hosted at Github.

### 1.1.5 Installation

You can install Celery either via the Python Package Index (PyPI) or from source.
To install using `pip`,:

$ pip install Celery

To install using `easy_install`,:

$ easy_install Celery

**Downloading and installing from source**

Download the latest version of Celery from [http://pypi.python.org/pypi/celery/](http://pypi.python.org/pypi/celery/)

You can install it by doing the following,:

$ tar xvfz celery-0.0.0.tar.gz
$ cd celery-0.0.0
$ python setup.py build
# python setup.py install # as root

**Using the development version**

You can clone the repository by doing the following:

$ git clone git://github.com/ask/celery.git

### 1.2 Broker Installation

- Installing RabbitMQ
- Setting up RabbitMQ
- Installing RabbitMQ on OS X
  - Configuring the system host name
  - Starting/Stopping the RabbitMQ server

#### 1.2.1 Installing RabbitMQ

See [Installing RabbitMQ](#) over at RabbitMQ’s website. For Mac OS X see [Installing RabbitMQ on OS X](#).

**Note:** If you’re getting `nodedown` errors after installing and using `rabbitmqctl` then this blog post can help you identify the source of the problem:


#### 1.2.2 Setting up RabbitMQ

To use celery we need to create a RabbitMQ user, a virtual host and allow that user access to that virtual host:
$ rabbitmqctl add_user myuser mypassword
$ rabbitmqctl add_vhost myvhost
$ rabbitmqctl set_permissions -p myvhost myuser ".*" ".*" ".*"

See the RabbitMQ Admin Guide for more information about access control.

### 1.2.3 Installing RabbitMQ on OS X

The easiest way to install RabbitMQ on Snow Leopard is using Homebrew; the new and shiny package management system for OS X.

In this example we’ll install Homebrew into `/lol`, but you can choose whichever destination, even in your home directory if you want, as one of the strengths of Homebrew is that it’s relocatable.

Homebrew is actually a git repository, so to install Homebrew, you first need to install git. Download and install from the disk image at [http://code.google.com/p/git-osx-installer/downloads/list?can=3](http://code.google.com/p/git-osx-installer/downloads/list?can=3)

When git is installed you can finally clone the repository, storing it at the `/lol` location:

```
$ git clone git://github.com/mxcl/homebrew /lol
```

Brew comes with a simple utility called `brew`, used to install, remove and query packages. To use it you first have to add it to `PATH`, by adding the following line to the end of your `~/.profile`:

```
export PATH="/lol/bin:/lol/sbin:$PATH"
```

Save your profile and reload it:

```
$ source ~/.profile
```

Finally, we can install rabbitmq using `brew`:

```
$ brew install rabbitmq
```

### Configuring the system host name

If you’re using a DHCP server that is giving you a random host name, you need to permanently configure the host name. This is because RabbitMQ uses the host name to communicate with nodes.

Use the `scutil` command to permanently set your host name:

```
sudo scutil --set HostName myhost.local
```

Then add that host name to `/etc/hosts` so it’s possible to resolve it back into an IP address:

```
127.0.0.1 localhost myhost myhost.local
```

If you start the rabbitmq server, your rabbit node should now be `rabbit@myhost`, as verified by `rabbitmqctl`:

```
$ sudo rabbitmqctl status
Status of node rabbit@myhost ...
[...running_applications,...
```

1.2. Broker Installation 7
This is especially important if your DHCP server gives you a host name starting with an IP address, (e.g. 23.10.112.31.comcast.net), because then RabbitMQ will try to use rabbit@23, which is an illegal host name.

### Starting/Stopping the RabbitMQ server

To start the server:

```
$ sudo rabbitmq-server
```

you can also run it in the background by adding the `--detached` option (note: only one dash):

```
$ sudo rabbitmq-server --detached
```

Never use `kill` to stop the RabbitMQ server, but rather use the `rabbitmqctl` command:

```
$ sudo rabbitmqctl stop
```

When the server is running, you can continue reading Setting up RabbitMQ.

### 1.3 First steps with Celery

- Creating a simple task
- Configuration
- Running the celery worker server
- Executing the task
- Where to go from here

#### 1.3.1 Creating a simple task

In this tutorial we are creating a simple task that adds two numbers. Tasks are defined in normal Python modules.

By convention we will call our module `tasks.py`, and it looks like this:

```python
from celery.task import task

@task
def add(x, y):
    return x + y
```

Behind the scenes the `@task` decorator actually creates a class that inherits from `Task`. The best practice is to only create custom task classes when you want to change generic behavior, and use the decorator to define tasks.

See also:

The full documentation on how to create tasks and task classes is in the *Tasks* part of the user guide.
1.3.2 Configuration

Celery is configured by using a configuration module. By default this module is called `celeryconfig.py`. The configuration module must either be in the current directory or on the Python path, so that it can be imported. You can also set a custom name for the configuration module by using the `CELERY_CONFIG_MODULE` environment variable.

Let's create our `celeryconfig.py`.

1. Configure how we communicate with the broker (RabbitMQ in this example):

   ```python
   BROKER_HOST = "localhost"
   BROKER_PORT = 5672
   BROKER_USER = "myuser"
   BROKER_PASSWORD = "mypassword"
   BROKER_VHOST = "myvhost"
   ```

2. Define the backend used to store task metadata and return values:

   ```python
   CELERY_RESULT_BACKEND = "amqp"
   ```

   The AMQP backend is non-persistent by default, and you can only fetch the result of a task once (as it’s sent as a message).

   For list of backends available and related options see Task result backend settings.

3. Finally we list the modules the worker should import. This includes the modules containing your tasks.

   ```python
   CELERY_IMPORTS = ("tasks", )
   ```

   That's it.

   There are more options available, like how many processes you want to use to process work in parallel (the `CELERY_CONCURRENCY` setting), and we could use a persistent result store backend, but for now, this should do. For all of the options available, see Configuration and defaults.

**Note:** You can also specify modules to import using the `-I` option to `celeryd`:

```
$ celeryd -l info -I tasks,handlers
```

This can be a single, or a comma separated list of task modules to import when `celeryd` starts.

1.3.3 Running the celery worker server

To test we will run the worker server in the foreground, so we can see what’s going on in the terminal:

```
$ celeryd --loglevel=INFO
```

In production you will probably want to run the worker in the background as a daemon. To do this you need to use the tools provided by your platform, or something like `supervisord` (see Running `celeryd` as a daemon for more information).

For a complete listing of the command line options available, do:

```
$ celeryd --help
```
1.3.4 Executing the task

Whenever we want to execute our task, we use the `delay()` method of the task class.

This is a handy shortcut to the `apply_async()` method which gives greater control of the task execution (see `Executing Tasks`).

```
>>> from tasks import add
>>> add.delay(4, 4)
<AsyncResult: 889143a6-39a2-4e52-837b-d80d33efb22d>
```

At this point, the task has been sent to the message broker. The message broker will hold on to the task until a worker server has consumed and executed it.

Right now we have to check the worker log files to know what happened with the task. This is because we didn’t keep the `AsyncResult` object returned.

The `AsyncResult` lets us check the state of the task, wait for the task to finish, get its return value or exception/traceback if the task failed, and more.

Let’s execute the task again – but this time we’ll keep track of the task by holding on to the `AsyncResult`:

```
>>> result = add.delay(4, 4)
>>> result.ready()  # returns True if the task has finished processing.
False
>>> result.result  # task is not ready, so no return value yet.
None
>>> result.get()   # Waits until the task is done and returns the retval.
8
>>> result.result  # direct access to result, doesn’t re-raise errors.
8
>>> result.successful()  # returns True if the task didn’t end in failure.
True
```

If the task raises an exception, the return value of `result.successful()` will be `False`, and `result.result` will contain the exception instance raised by the task.

1.3.5 Where to go from here

After this you should read the `User Guide`. Specifically `Tasks` and `Executing Tasks`.

1.4 Resources
### 1.4.1 Getting Help

**Mailing list**

For discussions about the usage, development, and future of celery, please join the celery-users mailing list.

**IRC**

Come chat with us on IRC. The #celery channel is located at the Freenode network.

### 1.4.2 Bug tracker

If you have any suggestions, bug reports or annoyances please report them to our issue tracker at http://github.com/ask/celery/issues/

### 1.4.3 Wiki

http://wiki.github.com/ask/celery/

### 1.4.4 Contributing

Development of celery happens at Github: http://github.com/ask/celery

You are highly encouraged to participate in the development of celery. If you don’t like Github (for some reason) you’re welcome to send regular patches.

Be sure to also read the Contributing to Celery section in the documentation.

### 1.4.5 License

This software is licensed under the New BSD License. See the LICENSE file in the top distribution directory for the full license text.
2.1 Overview

To use Celery you need at least two main components: a message broker and a worker.

The message broker enables clients and workers to communicate through messaging. There are several broker implementations available, the most popular being RabbitMQ.

The worker processes messages, and consists of one or more physical (or virtual) nodes.
2.1.1 Tasks

The action to take whenever a message of a certain type is received is called a “task”.

- Go to Tasks.
- Go to Executing Tasks.
- Go to Sets of tasks, Subtasks and Callbacks
- Go to Periodic Tasks.
- Go to HTTP Callback Tasks (Webhooks).

2.1.2 Workers

Go to Workers Guide.

2.1.3 Monitoring

Go to Monitoring and Management Guide.

2.1.4 Routing

Figure 2.2: Figure 2: Worker bindings.

Go to Routing Tasks.

Celery takes advantage of AMQPs flexible routing model. Tasks can be routed to specific servers, or a cluster of servers by binding workers to different queues. A single worker node can be bound to one or more queues. Multiple messaging scenarios are supported: round robin, point-to-point, broadcast (one-to-many), and more.

Celery aims to hide the complexity of AMQP through features like Automatic routing, while still preserving the ability to go low level if that should be necessary.
2.2 Tasks

- Basics
- Context
  - Example Usage
- Logging
- Retrying a task if something fails
  - Using a custom retry delay
- Task options
  - General
  - Message and routing options
- Task names
  - Automatic naming and relative imports
- Decorating tasks
- Task States
  - Result Backends
    - AMQP Result Backend
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    - PENDING
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- How it works
- Tips and Best Practices
  - Ignore results you don’t want
  - Disable rate limits if they’re not used
  - Avoid launching synchronous subtasks
- Performance and Strategies
  - Granularity
  - Data locality
  - State
  - Database transactions
- Example
  - blog/models.py
  - blog/views.py
  - blog/tasks.py

This guide gives an overview of how tasks are defined. For a complete listing of task attributes and methods, please see the API reference.

2.2.1 Basics

A task is a class that encapsulates a function and its execution options. Given a function create_user', that takes two arguments: username and password, you can create a task like this:

```python
from django.contrib.auth import User
```
@task
def create_user(username, password):
    User.objects.create(username=username, password=password)

Task options are added as arguments to `task`:

@task(serializer="json")
def create_user(username, password):
    User.objects.create(username=username, password=password)

## 2.2.2 Context

task.request contains information and state related the currently executing task, and must always contain the following attributes:

- **id**  The unique id of the executing task.
- **taskset**  The unique id of the taskset this task is a member of (if any).
- **args**  Positional arguments.
- **kwargs**  Keyword arguments.
- **retries**  How many times the current task has been retried. An integer starting at 0.
- **is_eager**  Set to `True` if the task is executed locally in the client, and not by a worker.
- **logfile**  The file the worker logs to. See Logging.
- **loglevel**  The current log level used.
- **delivery_info**

  Additional message delivery information. This is a mapping containing the exchange and routing key used to deliver this task. Used by e.g. `retry()` to resend the task to the same destination queue.

  NOTE As some messaging backends doesn’t have advanced routing capabilities, you can’t trust the availability of keys in this mapping.

### Example Usage

@task
def add(x, y):
    print("Executing task id %r, args: %r kwargs: %r" % (add.request.id, add.request.args, add.request.kwars))

## 2.2.3 Logging

You can use the workers logger to add diagnostic output to the worker log:

@task
def add(x, y):
    logger = add.get_logger()
    logger.info("Adding %s + %s" % (x, y))
    return x + y
There are several logging levels available, and the workers `loglevel` setting decides whether or not they will be written to the log file.

Of course, you can also simply use `print` as anything written to standard out/-err will be written to the log file as well.

### 2.2.4 Retrying a task if something fails

Simply use `retry()` to re-send the task. It will do the right thing, and respect the `max_retries` attribute:

```python
@task
def send_twitter_status(oauth, tweet):
    try:
        twitter = Twitter(oauth)
        twitter.update_status(tweet)
    except (Twitter.FailWhaleError, Twitter.LoginError), exc:
        send_twitter_status.retry(exc=exc)
```

Here we used the `exc` argument to pass the current exception to `retry()`. At each step of the retry this exception is available as the tombstone (result) of the task. When `max_retries` has been exceeded this is the exception raised. However, if an `exc` argument is not provided the `RetryTaskError` exception is raised instead.

#### Using a custom retry delay

When a task is to be retried, it will wait for a given amount of time before doing so. The default delay is in the `default_retry_delay` attribute on the task. By default this is set to 3 minutes. Note that the unit for setting the delay is in seconds (int or float).

You can also provide the `countdown` argument to `retry()` to override this default.

```python
@task(default_retry_delay=30 * 60)  # retry in 30 minutes.
def add(x, y):
    try:
        ...
    except Exception, exc:
        self.retry(exc=exc, countdown=60)  # override the default and retry in 1 minute
```

### 2.2.5 Task options

#### General

**Task.name**

The name the task is registered as.

You can set this name manually, or just use the default which is automatically generated using the module and class name. See `Task names`.

**Task.abstract**

Abstract classes are not registered, but are used as the base class for new task types.

**Task.max_retries**

The maximum number of attempted retries before giving up. If this exceeds the `MaxRetriesExceeded` an exception will be raised. **NOTE:** You have to `retry()` manually, it's not something that happens automatically.
**Task**. `default_retry_delay`  
Default time in seconds before a retry of the task should be executed. Can be either `int` or `float`. Default is a 3 minute delay.

**Task**. `rate_limit`  
Set the rate limit for this task type, i.e. how many times in a given period of time is the task allowed to run.  
If this is `None` no rate limit is in effect. If it is an integer, it is interpreted as “tasks per second”.  
The rate limits can be specified in seconds, minutes or hours by appending “/s”, “/m” or “/h” to the value.  
Example: “100/m” (hundred tasks a minute). Default is the `CELERY_DEFAULT_RATE_LIMIT` setting, which if not specified means rate limiting for tasks is disabled by default.

**Task**. `ignore_result`  
Don’t store task state. Note that this means you can’t use `AsyncResult` to check if the task is ready, or get its return value.

**Task**. `store_errors_even_if_ignored`  
If `True`, errors will be stored even if the task is configured to ignore results.

**Task**. `send_error_emails`  
Send an e-mail whenever a task of this type fails. Defaults to the `CELERY_SEND_TASK_ERROR_EMAILS` setting. See `Error E-Mails` for more information.

**Task**. `error_whitelist`  
If the sending of error e-mails is enabled for this task, then this is a white list of exceptions to actually send e-mails about.

**Task**. `serializer`  
A string identifying the default serialization method to use. Defaults to the `CELERY_TASK_SERIALIZER` setting. Can be `pickle`, `json`, `yaml`, or any custom serialization methods that have been registered with `kombu.serialization.registry`.  
Please see `Serializers` for more information.

**Task**. `backend`  
The result store backend to use for this task. Defaults to the `CELERY_RESULT_BACKEND` setting.

**Task**. `acks_late`  
If set to `True` messages for this task will be acknowledged after the task has been executed, not `just before`, which is the default behavior.  
Note that this means the task may be executed twice if the worker crashes in the middle of execution, which may be acceptable for some applications.  
The global default can be overridden by the `CELERY_ACKS_LATE` setting.

**Task**. `track_started`  
If `True` the task will report its status as “started” when the task is executed by a worker. The default value is `False` as the normal behaviour is to not report that level of granularity. Tasks are either pending, finished, or waiting to be retried. Having a “started” status can be useful for when there are long running tasks and there is a need to report which task is currently running.  
The host name and process id of the worker executing the task will be available in the state metadata (e.g. `result.info["pid"]`)  
The global default can be overridden by the `CELERY_TRACK_STARTED` setting.

See also:

The API reference for `BaseTask`. 
Message and routing options

Task.queue
Use the routing settings from a queue defined in CELERY_QUEUES. If defined the exchange and routing_key options will be ignored.

Task.exchange
Override the global default exchange for this task.

Task.routing_key
Override the global default routing_key for this task.

Task.mandatory
If set, the task message has mandatory routing. By default the task is silently dropped by the broker if it can’t be routed to a queue. However – If the task is mandatory, an exception will be raised instead.

Not supported by amqplib.

Task.immediate
Request immediate delivery. If the task cannot be routed to a task worker immediately, an exception will be raised. This is instead of the default behavior, where the broker will accept and queue the task, but with no guarantee that the task will ever be executed.

Not supported by amqplib.

Task.priority
The message priority. A number from 0 to 9, where 0 is the highest priority.

Not supported by RabbitMQ.

See also:
Routing options for more information about message options, and Routing Tasks.

2.2.6 Task names

The task type is identified by the task name.

If not provided a name will be automatically generated using the module and class name.

For example:

```python
>>> @task(name="sum-of-two-numbers")
>>> def add(x, y):
...     return x + y

>>> add.name
'sum-of-two-numbers'
```

The best practice is to use the module name as a prefix to classify the tasks using namespaces. This way the name won’t collide with the name from another module:

```python
>>> @task(name="tasks.add")
>>> def add(x, y):
...     return x + y

>>> add.name
'tasks.add'
```

Which is exactly the name that is automatically generated for this task if the module name is “tasks.py”: 
>>> @task()
>>> def add(x, y):
...     return x + y

>>> add.name
'tasks.add'

**Automatic naming and relative imports**

Relative imports and automatic name generation does not go well together, so if you’re using relative imports you should set the name explicitly.

For example if the client imports the module “myapp.tasks” as ”.tasks”, and the worker imports the module as “myapp.tasks”, the generated names won’t match and an `NotRegistered` error will be raised by the worker.

This is also the case if using Django and using `project.myapp`:

```python
INSTALLED_APPS = ("project.myapp", )
```

The worker will have the tasks registered as “project.myapp.tasks.*”, while this is what happens in the client if the module is imported as “myapp.tasks”:

```python
>>> from myapp.tasks import add
>>> add.name
'myapp.tasks.add'
```

For this reason you should never use “project.app”, but rather add the project directory to the Python path:

```python
import os
import sys
sys.path.append(os.getcwd())

INSTALLED_APPS = ("myapp", )
```

This makes more sense from the reusable app perspective anyway.

**2.2.7 Decorating tasks**

When using other decorators you must make sure that the `task` decorator is applied last:

```python
@task
@decorator2
@decorator1
def add(x, y):
    return x + y
```

Which means the `@task` decorator must be the top statement.

**2.2.8 Task States**

Celery can keep track of the tasks current state. The state also contains the result of a successful task, or the exception and traceback information of a failed task.

There are several `result backends` to choose from, and they all have different strenghts and weaknesses (see `Result Backends`).
During its lifetime a task will transition through several possible states, and each state may have arbitrary metadata attached to it. When a task moves into a new state the previous state is forgotten about, but some transitions can be deducted, (e.g. a task now in the FAILED state, is implied to have been in the STARTED state at some point).

There are also sets of states, like the set of failure states, and the set of ready states.

The client uses the membership of these sets to decide whether the exception should be re-raised (PROPAGATE_STATES), or whether the result can be cached (it can if the task is ready).

You can also define Custom states.

**Result Backends**

Celery needs to store or send the states somewhere. There are several built-in backends to choose from: SQLAlchemy/Django ORM, Memcached, Redis, AMQP, MongoDB, Tokyo Tyrant and Redis – or you can define your own.

There is no backend that works well for every single use case, but for historical reasons the default backend is the AMQP backend. You should read about the strengths and weaknesses of each backend, and choose the most appropriate for your own needs.

See also:

*Task result backend settings*

**AMQP Result Backend**

The AMQP result backend is special as it does not actually store the states, but rather sends them as messages. This is an important difference as it means that a result can only be retrieved once; If you have two processes waiting for the same result, one of the processes will never receive the result!

Even with that limitation, it is an excellent choice if you need to receive state changes in real-time. Using messaging means the client does not have to poll for new states.

There are several other pitfalls you should be aware of when using the AMQP backend:

- Every new task creates a new queue on the server, with thousands of tasks the broker may be overloaded with queues and this will affect performance in negative ways. If you’re using RabbitMQ then each queue will be a separate Erlang process, so if you’re planning to keep many results simultaneously you may have to increase the Erlang process limit, and the maximum number of file descriptors your OS allows.

- Old results will not be cleaned automatically, so you must make sure to consume the results or else the number of queues will eventually go out of control. If you’re running RabbitMQ 2.1.1 or higher you can take advantage of the x-expires argument to queues, which will expire queues after a certain time limit after they are unused. The queue expiry can be set (in seconds) by the CELERY_AMQP_TASK_RESULT_EXPIRES setting (not enabled by default).

For a list of options supported by the AMQP result backend, please see AMQP backend settings.

**Database Result Backend**

Keeping state in the database can be convenient for many, especially for web applications with a database already in place, but it also comes with limitations.

- Polling the database for new states is expensive, and so you should increase the polling intervals of operations such as result.wait(), and tasksetresult.join()
• Some databases use a default transaction isolation level that is not suitable for polling tables for changes.

In MySQL the default transaction isolation level is `REPEATABLE-READ`, which means the transaction will not see changes by other transactions until the transaction is committed. It is recommended that you change to the `READ-COMMITTED` isolation level.

**Built-in States**

**PENDING**

Task is waiting for execution or unknown. Any task id that is not know is implied to be in the pending state.

**STARTED**

Task has been started. Not reported by default, to enable please see `attr`Task.track_started`.

**metadata** `pid` and `hostname` of the worker process executing the task.

**SUCCESS**

Task has been successfully executed.

**metadata** `result` contains the return value of the task.

**propagates** Yes

**ready** Yes

**FAILURE**

Task execution resulted in failure.

**metadata** `result` contains the exception occurred, and `traceback` contains the backtrace of the stack at the point when the exception was raised.

**propagates** Yes

**RETRY**

Task is being retried.

**metadata** `result` contains the exception that caused the retry, and `traceback` contains the backtrace of the stack at the point when the exceptions was raised.

**propagates** No

**REVOLED**

Task has been revoked.

**propagates** Yes
Custom states

You can easily define your own states, all you need is a unique name. The name of the state is usually an uppercase string. As an example you could have a look at abortable tasks which defines its own custom ABORTED state.

Use `Task.update_state` to update a tasks state:

```python
def upload_files(filenames):
    for i, file in enumerate(filenames):
        upload_files.update_state(state="PROGRESS",
                                   meta={"current": i, "total": len(filenames)})
```

Here we created the state “PROGRESS”, which tells any application aware of this state that the task is currently in progress, and also where it is in the process by having current and total counts as part of the state metadata. This can then be used to create e.g. progress bars.

2.2.9 How it works

Here comes the technical details, this part isn’t something you need to know, but you may be interested.

All defined tasks are listed in a registry. The registry contains a list of task names and their task classes. You can investigate this registry yourself:

```python
>>> from celery import registry
>>> from celery import task
>>> registry.tasks
{"celery.delete_expired_task_meta":
    <PeriodicTask: celery.delete_expired_task_meta (periodic)>,
"celery.task.http.HttpDispatchTask":
    <Task: celery.task.http.HttpDispatchTask (regular)>,
"celery.execute_remote":
    <Task: celery.execute_remote (regular)>,
"celery.map_async":
    <Task: celery.map_async (regular)>,
"celery.ping":
    <Task: celery.ping (regular)>}
```

This is the list of tasks built-in to celery. Note that we had to import `celery.task` first for these to show up. This is because the tasks will only be registered when the module they are defined in is imported.

The default loader imports any modules listed in the `CELERY_IMPORTS` setting.

The entity responsible for registering your task in the registry is a meta class, `TaskType`. This is the default meta class for `BaseTask`.

If you want to register your task manually you can mark the task as `abstract`:

```python
class MyTask(Task):
    abstract = True
```

This way the task won’t be registered, but any task inheriting from it will be.

When tasks are sent, we don’t send any actual function code, just the name of the task to execute. When the worker then receives the message it can look up the name in its task registry to find the execution code.

This means that your workers should always be updated with the same software as the client. This is a drawback, but the alternative is a technical challenge that has yet to be solved.
2.2.10 Tips and Best Practices

Ignore results you don’t want

If you don’t care about the results of a task, be sure to set the `ignore_result` option, as storing results wastes time and resources.

```python
@task(ignore_result=True)
def mytask(...):
    something()
```

Results can even be disabled globally using the `CELERY_IGNORE_RESULT` setting.

Disable rate limits if they’re not used

Disabling rate limits altogether is recommended if you don’t have any tasks using them. This is because the rate limit subsystem introduces quite a lot of complexity.

Set the `CELERY_DISABLE_RATE_LIMITS` setting to globally disable rate limits:

```python
CELERY_DISABLE_RATE_LIMITS = True
```

Avoid launching synchronous subtasks

Having a task wait for the result of another task is really inefficient, and may even cause a deadlock if the worker pool is exhausted.

Make your design asynchronous instead, for example by using callbacks.

**Bad:**

```python
@task
def update_page_info(url):
    page = fetch_page.delay(url).get()
    info = parse_page.delay(url, page).get()
    store_page_info.delay(url, info)
```

```python
@task
def fetch_page(url):
    return myhttplib.get(url)
```

```python
@task
def parse_page(url, page):
    return myparser.parse_document(page)
```

```python
@task
def store_page_info(url, info):
    return PageInfo.objects.create(url, info)
```

**Good:**

```python
@task(ignore_result=True)
def update_page_info(url):
    # fetch_page -> parse_page -> store_page
    fetch_page.delay(url, callback=subtask(parse_page,
                                           callback=subtask(store_page_info)))
```
We use `subtask` here to safely pass around the callback task. `subtask` is a subclass of `dict` used to wrap the arguments and execution options for a single task invocation.

See also:

*Subtasks* for more information about subtasks.

### 2.2.11 Performance and Strategies

#### Granularity

The task granularity is the amount of computation needed by each subtask. In general it is better to split the problem up into many small tasks, than have a few long running tasks.

With smaller tasks you can process more tasks in parallel and the tasks won’t run long enough to block the worker from processing other waiting tasks.

However, executing a task does have overhead. A message needs to be sent, data may not be local, etc. So if the tasks are too fine-grained the additional overhead may not be worth it in the end.

See also:

The book *Art of Concurrency* has a whole section dedicated to the topic of task granularity.

#### Data locality

The worker processing the task should be as close to the data as possible. The best would be to have a copy in memory, the worst would be a full transfer from another continent.

If the data is far away, you could try to run another worker at location, or if that’s not possible - cache often used data, or preload data you know is going to be used.

The easiest way to share data between workers is to use a distributed cache system, like memcached.

See also:

The paper *Distributed Computing Economics* by Jim Gray is an excellent introduction to the topic of data locality.
State

Since celery is a distributed system, you can’t know in which process, or on what machine the task will be executed. You can’t even know if the task will run in a timely manner.

The ancient async sayings tells us that “asserting the world is the responsibility of the task”. What this means is that the world view may have changed since the task was requested, so the task is responsible for making sure the world is how it should be; If you have a task that re-indexes a search engine, and the search engine should only be re-indexed at maximum every 5 minutes, then it must be the tasks responsibility to assert that, not the callers.

Another gotcha is Django model objects. They shouldn’t be passed on as arguments to tasks. It’s almost always better to re-fetch the object from the database when the task is running instead, as using old data may lead to race conditions.

Imagine the following scenario where you have an article and a task that automatically expands some abbreviations in it:

```python
class Article(models.Model):
    title = models.CharField()
    body = models.TextField()

@task
def expand_abbreviations(article):
    article.body.replace("MyCorp", "My Corporation")
    article.save()
```

First, an author creates an article and saves it, then the author clicks on a button that initiates the abbreviation task.

```python
>>> article = Article.objects.get(id=102)
>>> expand_abbreviations.delay(article)
```

Now, the queue is very busy, so the task won’t be run for another 2 minutes. In the meantime another author makes changes to the article, so when the task is finally run, the body of the article is reverted to the old version because the task had the old body in its argument.

Fixing the race condition is easy, just use the article id instead, and re-fetch the article in the task body:

```python
@task
def expand_abbreviations(article_id):
    article = Article.objects.get(id=article_id)
    article.body.replace("MyCorp", "My Corporation")
    article.save()
```

```python
>>> expand_abbreviations(article_id)
```

There might even be performance benefits to this approach, as sending large messages may be expensive.

Database transactions

Let’s have a look at another example:

```python
from django.db import transaction

@transaction.commit_on_success
def create_article(request):
    article = Article.objects.create(....)
    expand_abbreviations.delay(article.pk)
```
This is a Django view creating an article object in the database, then passing the primary key to a task. It uses the `commit_on_success` decorator, which will commit the transaction when the view returns, or roll back if the view raises an exception.

There is a race condition if the task starts executing before the transaction has been committed; The database object does not exist yet!

The solution is to *always commit transactions before sending tasks depending on state from the current transaction*:

```python
@transaction.commit_manually
def create_article(request):
    try:
        article = Article.objects.create(...)
    except:
        transaction.rollback()
    else:
        transaction.commit()
        expand_abbreviations.delay(article.pk)
```

### 2.2.12 Example

Let’s take a real world example; A blog where comments posted needs to be filtered for spam. When the comment is created, the spam filter runs in the background, so the user doesn’t have to wait for it to finish.

We have a Django blog application allowing comments on blog posts. We’ll describe parts of the models/views and tasks for this application.

**blog/models.py**

The comment model looks like this:

```python
from django.db import models
from django.utils.translation import ugettext_lazy as _

class Comment(models.Model):
    name = models.CharField(_("name"), max_length=64)
    email_address = models.EmailField(_("e-mail address"))
    homepage = models.URLField(_("home page"),
                                blank=True, verify_exists=False)
    comment = models.TextField(_("comment"))
    pub_date = models.DateTimeField(_("Published date"),
                                    editable=False, auto_add_now=True)
    is_spam = models.BooleanField(_("spam?"),
                                   default=False, editable=False)

    class Meta:
        verbose_name = _("comment")
        verbose_name_plural = _("comments")
```

In the view where the comment is posted, we first write the comment to the database, then we launch the spam filter task in the background.
blog/views.py

from django import forms
from django.http import HttpResponseRedirect
from django.template.context import RequestContext
from django.shortcuts import get_object_or_404, render_to_response
from blog import tasks
from blog.models import Comment

class CommentForm(forms.ModelForm):
    class Meta:
        model = Comment

def add_comment(request, slug, template_name="comments/create.html"):
    post = get_object_or_404(Entry, slug=slug)
    remote_addr = request.META.get("REMOTE_ADDR")

    if request.method == "post":
        form = CommentForm(request.POST, request.FILES)
        if form.is_valid():
            comment = form.save()
            # Check spam asynchronously.
            tasks.spam_filter.delay(comment_id=comment.id, 
                                     remote_addr=remote_addr)
            return HttpResponseRedirect(post.get_absolute_url())
    else:
        form = CommentForm()

        context = RequestContext(request, {"form": form})
        return render_to_response(template_name, context_instance=context)

To filter spam in comments we use Akismet, the service used to filter spam in comments posted to the free weblog platform Wordpress. Akismet is free for personal use, but for commercial use you need to pay. You have to sign up to their service to get an API key.

To make API calls to Akismet we use the akismet.py library written by Michael Foord.

blog/tasks.py

from akismet import Akismet
from celery.task import task

from django.core.exceptions import ImproperlyConfigured
from django.contrib.sites.models import Site

from blog.models import Comment

@task
def spam_filter(comment_id, remote_addr=None):
    logger = spam_filter.get_logger()
    logger.info("Running spam filter for comment %s" % comment_id)
comment = Comment.objects.get(pk=comment_id)
current_domain = Site.objects.get_current().domain
akismet = Akismet(settings.AKISMET_KEY, "http://%s" % domain)
if not akismet.verify_key():
    raise ImproperlyConfigured("Invalid AKISMET KEY")

is_spam = akismet.comment_check(user_ip=remote_addr,
                                comment_content=comment.comment,
                                comment_author=comment.name,
                                comment_author_email=comment.email_address)

if is_spam:
    comment.is_spam = True
    comment.save()

return is_spam

2.3 Executing Tasks

- Basics
- ETA and countdown
- Expiration
- Serializers
- Connections and connection timeouts.
- Routing options
- AMQP options

2.3.1 Basics

Executing a task is done with apply_async(), and the shortcut: delay().

delay is simple and convenient, as it looks like calling a regular function:

Task.delay(arg1, arg2, kwarg1="x", kwarg2="y")

The same using apply_async is written like this:

Task.apply_async(args=[arg1, arg2], kwargs={"kwarg1": "x", "kwarg2": "y"})

While delay is convenient, it doesn’t give you as much control as using apply_async. With apply_async you can override the execution options available as attributes on the Task class (see Task options). In addition you can set countdown/eta, task expiry, provide a custom broker connection and more.

Let’s go over these in more detail. All the examples uses a simple task called add, returning the sum of two positional arguments:

@task
def add(x, y):
    return x + y

Note: You can also execute a task by name using send_task(), if you don’t have access to the task class:
>>> from celery.execute import send_task
>>> result = send_task("tasks.add", [2, 2])
>>> result.get()
4

### 2.3.2 ETA and countdown

The ETA (estimated time of arrival) lets you set a specific date and time that is the earliest time at which your task will be executed. `countdown` is a shortcut to set eta by seconds into the future.

```python
>>> result = add.apply_async(args=[10, 10], countdown=3)
>>> result.get()  # this takes at least 3 seconds to return
20
```

The task is guaranteed to be executed at some time after the specified date and time, but not necessarily at that exact time. Possible reasons for broken deadlines may include many items waiting in the queue, or heavy network latency. To make sure your tasks are executed in a timely manner you should monitor queue lengths. Use Munin, or similar tools, to receive alerts, so appropriate action can be taken to ease the workload. See Munin.

While `countdown` is an integer, `eta` must be a `datetime` object, specifying an exact date and time (including millisecond precision, and timezone information):

```python
>>> from datetime import datetime, timedelta
>>> tomorrow = datetime.now() + timedelta(days=1)
>>> add.apply_async(args=[10, 10], eta=tomorrow)
```

### 2.3.3 Expiration

The `expires` argument defines an optional expiry time, either as seconds after task publish, or a specific date and time using `datetime`:

```python
>>> # Task expires after one minute from now.
>>> add.apply_async(args=[10, 10], expires=60)

>>> # Also supports datetime
>>> from datetime import datetime, timedelta
>>> add.apply_async(args=[10, 10], kargs,
... expires=datetime.now() + timedelta(days=1))
```

When a worker receives an expired task it will mark the task as `REVOKED` (TaskRevokedError).

### 2.3.4 Serializers

Data transferred between clients and workers needs to be serialized. The default serializer is `pickle`, but you can change this globally or for each individual task. There is built-in support for `pickle`, `JSON`, `YAML` and `msgpack`, and you can also add your own custom serializers by registering them into the Kombu serializer registry (see Kombu: Serialization of Data).

Each option has its advantages and disadvantages.

`json` – **JSON is supported in many programming languages, is now** a standard part of Python (since 2.6), and is fairly fast to decode using the modern Python libraries such as `cjson` or `simplejson`. 
The primary disadvantage to JSON is that it limits you to the following data types: strings, Unicode, floats, boolean, dictionaries, and lists. Decimals and dates are notably missing.

Also, binary data will be transferred using Base64 encoding, which will cause the transferred data to be around 34% larger than an encoding which supports native binary types.

However, if your data fits inside the above constraints and you need cross-language support, the default setting of JSON is probably your best choice.

See http://json.org for more information.

pickle – If you have no desire to support any language other than Python, then using the pickle encoding will gain you the support of all built-in Python data types (except class instances), smaller messages when sending binary files, and a slight speedup over JSON processing.

See http://docs.python.org/library/pickle.html for more information.

yaml – YAML has many of the same characteristics as json, except that it natively supports more data types (including dates, recursive references, etc.)

However, the Python libraries for YAML are a good bit slower than the libraries for JSON.

If you need a more expressive set of data types and need to maintain cross-language compatibility, then YAML may be a better fit than the above.

See http://yaml.org/ for more information.

msgpack – msgpack is a binary serialization format that is closer to JSON in features. It is very young however, and support should be considered experimental at this point.

See http://msgpack.org/ for more information.

The encoding used is available as a message header, so the worker knows how to deserialize any task. If you use a custom serializer, this serializer must be available for the worker.

The client uses the following order to decide which serializer to use when sending a task:

1. The serializer argument to apply_async
2. The tasks serializer attribute
3. The default CELERY_TASK_SERIALIZER setting.
   • Using the serializer argument to apply_async:

```python
>>> add.apply_async(args=[10, 10], serializer="json")
```

### 2.3.5 Connections and connection timeouts.

Currently there is no support for broker connection pools, so apply_async establishes and closes a new connection every time it is called. This is something you need to be aware of when sending more than one task at a time.

You handle the connection manually by creating a publisher:

```python
numbers = [(2, 2), (4, 4), (8, 8), (16, 16)]
results = []
publisher = add.get_publisher()
try:
    for args in numbers:
        res = add.apply_async(args=args, publisher=publisher)
        results.append(res)
finally:
```
Note: This particular example is better expressed as a task set. See Task Sets. Tasksets already reuses connections.

The connection timeout is the number of seconds to wait before giving up on establishing the connection. You can set this by using the connect_timeout argument to apply_async:

```python
add.apply_async([10, 10], connect_timeout=3)
```

Or if you handle the connection manually:

```python
publisher = add.get_publisher(connect_timeout=3)
```

### 2.3.6 Routing options

Celery uses the AMQP routing mechanisms to route tasks to different workers.

Messages (tasks) are sent to exchanges, a queue binds to an exchange with a routing key. Let’s look at an example:

Let’s pretend we have an application with lot of different tasks: some process video, others process images, and some gather collective intelligence about its users. Some of these tasks are more important, so we want to make sure the high priority tasks get sent to dedicated nodes.

For the sake of this example we have a single exchange called tasks. There are different types of exchanges, each type interpreting the routing key in different ways, implementing different messaging scenarios.

The most common types used with Celery are direct and topic.

- **direct**
  
  Matches the routing key exactly.

- **topic**
  
  In the topic exchange the routing key is made up of words separated by dots (.). Words can be matched by the wild cards *, and #, where * matches one exact word, and # matches one or many words.

  For example, *.stock.# matches the routing keys usd.stock and euro.stock.db but not stock.nasdaq.

We create three queues, video, image and lowpri that binds to the tasks exchange. For the queues we use the following binding keys:

```python
video: video.#
image: image.#
lowpri: misc.#
```

Now we can send our tasks to different worker machines, by making the workers listen to different queues:

```python
>>> add.apply_async(args=[filename],
...                   routing_key="video.compress")
```

```python
>>> add.apply_async(args=[filename, 360],
...                   routing_key="image.rotate")
```

```python
>>> add.apply_async(args=[filename, selection],
```
... routing_key="image.crop")
>>> add.apply_async(routing_key="misc.recommend")

Later, if the crop task is consuming a lot of resources, we can bind new workers to handle just the “image.crop” task, by creating a new queue that binds to “image.crop”.

See also:
To find out more about routing, please see Routing Tasks.

2.3.7 AMQP options

- mandatory
This sets the delivery to be mandatory. An exception will be raised if there are no running workers able to take on the task.

Not supported by amqplib.

- immediate
Request immediate delivery. Will raise an exception if the task cannot be routed to a worker immediately.

Not supported by amqplib.

- priority
A number between 0 and 9, where 0 is the highest priority.

Note: RabbitMQ does not yet support AMQP priorities.

2.4 Workers Guide

- Starting the worker
- Stopping the worker
- Restarting the worker
- Concurrency
- Persistent revokes
- Time limits
- Max tasks per child setting
- Remote control
  - The broadcast() function.
  - Rate limits
  - Revoking tasks
  - Remote shutdown
  - Ping
  - Enable/disable events
  - Writing your own remote control commands
- Inspecting workers
  - Dump of registered tasks
  - Dump of currently executing tasks
  - Dump of scheduled (ETA) tasks
  - Dump of reserved tasks
2.4.1 Starting the worker

You can start celeryd to run in the foreground by executing the command:

```
$ celeryd --loglevel=INFO
```

You probably want to use a daemonization tool to start celeryd in the background. See Running celeryd as a daemon for help using celeryd with popular daemonization tools.

For a full list of available command line options see celeryd, or simply do:

```
$ celeryd --help
```

You can also start multiple workers on the same machine. If you do so be sure to give a unique name to each individual worker by specifying a host name with the `--hostname|-n` argument:

```
$ celeryd --loglevel=INFO --concurrency=10 -n worker1.example.com
$ celeryd --loglevel=INFO --concurrency=10 -n worker2.example.com
$ celeryd --loglevel=INFO --concurrency=10 -n worker3.example.com
```

2.4.2 Stopping the worker

Shutdown should be accomplished using the TERM signal.

When shutdown is initiated the worker will finish all currently executing tasks before it actually terminates, so if these tasks are important you should wait for it to finish before doing anything drastic (like sending the KILL signal).

If the worker won’t shutdown after considerate time, for example because of tasks stuck in an infinite-loop, you can use the KILL signal to force terminate the worker, but be aware that currently executing tasks will be lost (unless the tasks have the `acks_late` option set).

Also as processes can’t override the KILL signal, the worker will not be able to reap its children, so make sure to do so manually. This command usually does the trick:

```
$ ps auxww | grep celeryd | awk '{print $2}' | xargs kill -9
```

2.4.3 Restarting the worker

Other than stopping then starting the worker to restart, you can also restart the worker using the HUP signal:

```
$ kill -HUP $pid
```

The worker will then replace itself with a new instance using the same arguments as it was started with.

2.4.4 Concurrency

By default multiprocessing is used to perform concurrent execution of tasks, but you can also use Eventlet. The number of worker processes/threads can be changed using the `--concurrency` argument and defaults to the number of CPUs available on the machine.

**Number of processes (multiprocessing)**

More worker processes are usually better, but there’s a cut-off point where adding more processes affects performance in negative ways. There is even some evidence to support that having multiple celeryd’s running, may perform better than having a single worker. For example 3 celeryd’s with 10 worker processes each. You need to experiment to find the numbers that works best for you, as this varies based on application, work load, task run times and other factors.
2.4.5 Persistent revokes

Revoking tasks works by sending a broadcast message to all the workers, the workers then keep a list of revoked tasks in memory.

If you want tasks to remain revoked after worker restart you need to specify a file for these to be stored in, either by using the `--statedb` argument to `celeryd` or the `CELERYD_STATE_DB` setting. See `CELERYD_STATE_DB` for more information.

2.4.6 Time limits

New in version 2.0.

A single task can potentially run forever, if you have lots of tasks waiting for some event that will never happen you will block the worker from processing new tasks indefinitely. The best way to defend against this scenario happening is enabling time limits.

The time limit (`--time-limit`) is the maximum number of seconds a task may run before the process executing it is terminated and replaced by a new process. You can also enable a soft time limit (`--soft-time-limit`), this raises an exception the task can catch to clean up before the hard time limit kills it:

```python
from celery.task import task
from celery.exceptions import SoftTimeLimitExceeded

@task()
def mytask():
    try:
        do_work()
    except SoftTimeLimitExceeded:
        clean_up_in_a_hurry()
```

Time limits can also be set using the `CELERYD_TASK_TIME_LIMIT` / `CELERYD_SOFT_TASK_TIME_LIMIT` settings.

**Note:** Time limits do not currently work on Windows.

2.4.7 Max tasks per child setting

With this option you can configure the maximum number of tasks a worker can execute before it’s replaced by a new process.

This is useful if you have memory leaks you have no control over for example from closed source C extensions.

The option can be set using the `--maxtasksperchild` argument to `celeryd` or using the `CELERYD_MAX_TASKS_PER_CHILD` setting.

2.4.8 Remote control

New in version 2.0.

Workers have the ability to be remote controlled using a high-priority broadcast message queue. The commands can be directed to all, or a specific list of workers.
Commands can also have replies. The client can then wait for and collect those replies. Since there’s no central authority to know how many workers are available in the cluster, there is also no way to estimate how many workers may send a reply, so the client has a configurable timeout — the deadline in seconds for replies to arrive in. This timeout defaults to one second. If the worker doesn’t reply within the deadline it doesn’t necessarily mean the worker didn’t reply, or worse is dead, but may simply be caused by network latency or the worker being slow at processing commands, so adjust the timeout accordingly.

In addition to timeouts, the client can specify the maximum number of replies to wait for. If a destination is specified, this limit is set to the number of destination hosts.

See also:
The celeryctl program is used to execute remote control commands from the command line. It supports all of the commands listed below. See celeryctl: Management Utility for more information.

**The broadcast() function.**

This is the client function used to send commands to the workers. Some remote control commands also have higher-level interfaces using broadcast() in the background, like rate_limit() and ping().

Sending the rate_limit command and keyword arguments:

```python
>>> from celery.task.control import broadcast
>>> broadcast("rate_limit", arguments={"task_name": "myapp.mytask",
...   "rate_limit": "200/m"})
```

This will send the command asynchronously, without waiting for a reply. To request a reply you have to use the reply argument:

```python
>>> broadcast("rate_limit", {"task_name": "myapp.mytask",
...   "rate_limit": "200/m"}, reply=True)
[{'worker1.example.com': 'New rate limit set successfully'},
 {'worker2.example.com': 'New rate limit set successfully'},
 {'worker3.example.com': 'New rate limit set successfully'}]
```

Using the destination argument you can specify a list of workers to receive the command:

```python
>>> broadcast("rate_limit", {"task_name": "myapp.mytask",
...   "rate_limit": "200/m"}, reply=True,
...   destination=['worker1.example.com'])
[{'worker1.example.com': 'New rate limit set successfully'}]
```

Of course, using the higher-level interface to set rate limits is much more convenient, but there are commands that can only be requested using broadcast().

**Rate limits**

Example changing the rate limit for the myapp.mytask task to accept 200 tasks a minute on all servers:

```python
>>> from celery.task.control import rate_limit
>>> rate_limit("myapp.mytask", "200/m")
```

Example changing the rate limit on a single host by specifying the destination hostname:

```python
>>> rate_limit("myapp.mytask", "200/m",
...   destination=['worker1.example.com'])
```
Warning: This won’t affect workers with the `CELERY_DISABLE_RATE_LIMITS` setting on. To re-enable rate limits then you have to restart the worker.

### Revoking tasks

All worker nodes keep a memory of revoked task ids, either in-memory or persistent on disk (see `Persistent revokes`). When a worker receives a revoke request it will skip executing the task, but it won’t terminate an already executing task unless the `terminate` option is set.

If `terminate` is set the worker child process processing the task will be terminated. The default signal sent is `TERM`, but you can specify this using the `signal` argument. Signal can be the uppercase name of any signal defined in the `signal` module in the Python Standard Library.

Terminating a task also revokes it.

**Example**

```python
>>> from celery.task.control import revoke
>>> revoke("d9078da5-9915-40a0-bfa1-392c7bde42ed")

>>> revoke("d9078da5-9915-40a0-bfa1-392c7bde42ed",
... terminate=True)

>>> revoke("d9078da5-9915-40a0-bfa1-392c7bde42ed",
... terminate=True, signal="SIGKILL")
```

### Remote shutdown

This command will gracefully shut down the worker remotely:

```python
>>> broadcast("shutdown")  # shutdown all workers
>>> broadcast("shutdown, destination=worker1.example.com")
```

### Ping

This command requests a ping from alive workers. The workers reply with the string ‘pong’, and that’s just about it. It will use the default one second timeout for replies unless you specify a custom timeout:

```python
>>> from celery.task.control import ping
>>> ping(timeout=0.5)
[['worker1.example.com': 'pong'],
 ['worker2.example.com': 'pong'],
 ['worker3.example.com': 'pong']]

ping() also supports the `destination` argument, so you can specify which workers to ping:

```python
>>> ping(['worker2.example.com', 'worker3.example.com'])
[['worker2.example.com': 'pong'],
 ['worker3.example.com': 'pong']]
```
Enable/disable events

You can enable/disable events by using the `enable_events`, `disable_events` commands. This is useful to temporarily monitor a worker using `celeryev/celerymon`.

```python
>>> broadcast("enable_events")
>>> broadcast("disable_events")
```

Writing your own remote control commands

Remote control commands are registered in the control panel and they take a single argument: the current `ControlDispatch` instance. From there you have access to the active `Consumer` if needed.

Here’s an example control command that restarts the broker connection:

```python
from celery.worker.control import Panel

@Panel.register
def reset_connection(panel):
    panel.logger.critical("Connection reset by remote control.")
    panel.consumer.reset_connection()
    return {"ok": "connection reset"}
```

These can be added to task modules, or you can keep them in their own module then import them using the `CELERY_IMPORTS` setting:

```python
CELERY_IMPORTS = ("myapp.worker.control",)
```

2.4.9 Inspecting workers

celery.task.control.inspect lets you inspect running workers. It uses remote control commands under the hood.

```python
>>> from celery.task.control import inspect

# Inspect all nodes.
>>> i = inspect()

# Specify multiple nodes to inspect.
>>> i = inspect(['worker1.example.com', 'worker2.example.com'])

# Specify a single node to inspect.
>>> i = inspect('worker1.example.com')
```

Dump of registered tasks

You can get a list of tasks registered in the worker using the `registered_tasks()`:

```python
>>> i.registered_tasks()
[['worker1.example.com': ['celery.delete_expired_task_meta',
      'celery.execute_remote',
      'celery.map_async',
      'celery.ping',
      'celery.task.http.HttpDispatchTask',
      '...]]
```
Dump of currently executing tasks

You can get a list of active tasks using active():

```python
>>> i.active()
[{'worker1.example.com':
  [{"name": "tasks.sleeptask",
    "id": "32666e9b-809c-41fa-8e93-5ae0c80afbbf",
    "args": "(8,)",
    "kwargs": "{}"]}]
```

Dump of scheduled (ETA) tasks

You can get a list of tasks waiting to be scheduled by using scheduled():

```python
>>> i.scheduled()
[{'worker1.example.com':
  [{"eta": "2010-06-07 09:07:52", "priority": 0,
    "request": {
      "name": "tasks.sleeptask",
      "id": "1a7980ea-8b19-413e-91d2-0b74f3844c4d",
      "args": "[1]",
      "kwargs": "{}"},
    "eta": "2010-06-07 09:07:53", "priority": 0,
    "request": {
      "name": "tasks.sleeptask",
      "id": "49661b9a-aa22-4120-94b7-9ee8031d219d",
      "args": "[2]",
      "kwargs": "{}"}]}
```

Note that these are tasks with an eta/countdown argument, not periodic tasks.

Dump of reserved tasks

Reserved tasks are tasks that has been received, but is still waiting to be executed.

You can get a list of these using reserved():

```python
>>> i.reserved()
[{'worker1.example.com':
  [{"name": "tasks.sleeptask",
    "id": "32666e9b-809c-41fa-8e93-5ae0c80afbbf",
    "args": "(8,)",
    "kwargs": "{}"]}]
```

2.5 Periodic Tasks
2.5.1 Introduction

celerybeat is a scheduler. It kicks off tasks at regular intervals, which are then executed by the worker nodes available in the cluster.

By default the entries are taken from the CELERYBEAT_SCHEDULE setting, but custom stores can also be used, like storing the entries in an SQL database.

You have to ensure only a single scheduler is running for a schedule at a time, otherwise you would end up with duplicate tasks. Using a centralized approach means the schedule does not have to be synchronized, and the service can operate without using locks.

2.5.2 Entries

To schedule a task periodically you have to add an entry to the CELERYBEAT_SCHEDULE setting.

Example: Run the tasks.add task every 30 seconds.

```python
from datetime import timedelta

CELERYBEAT_SCHEDULE = {
    "runs-every-30-seconds": {
        "task": "tasks.add",
        "schedule": timedelta(seconds=30),
        "args": (16, 16)
    },
}
```

Using a timedelta for the schedule means the task will be executed 30 seconds after celerybeat starts, and then every 30 seconds after the last run. A crontab like schedule also exists, see the section on Crontab schedules.

Available Fields

- **task**
  
The name of the task to execute.

- **schedule**
  
The frequency of execution.
  
  This can be the number of seconds as an integer, a timedelta, or a crontab. You can also define your own custom schedule types, by extending the interface of schedule.

- **args**
  
  Positional arguments (list or tuple).

- **kwargs**
Keyword arguments (dict).

- **options**
  
  Execution options (dict).
  
  This can be any argument supported by `apply_async()`, e.g. `exchange`, `routing_key`, `expires`, and so on.

- **relative**
  
  By default, timedelta schedules are scheduled “by the clock”. This means the frequency is rounded to the nearest second, minute, hour or day depending on the period of the timedelta.

  If `relative` is true the frequency is not rounded and will be relative to the time when `celerybeat` was started.

### 2.5.3 Crontab schedules

If you want more control over when the task is executed, for example, a particular time of day or day of the week, you can use the `crontab` schedule type:

```python
from celery.schedules import crontab

CELERYBEAT_SCHEDULE = {
    "every-monday-morning": {
        "task": "tasks.add",
        "schedule": crontab(hour=7, minute=30, day_of_week=1),
        "args": (16, 16),
    },
}
```

The syntax of these crontab expressions are very flexible. Some examples:
### Example

<table>
<thead>
<tr>
<th>CRON Command</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>crontab()</code></td>
<td>Execute every minute.</td>
</tr>
<tr>
<td><code>crontab(minute=0, hour=0)</code></td>
<td>Execute daily at midnight.</td>
</tr>
<tr>
<td><code>crontab(minute=0, hour=&quot;*/3&quot;)</code></td>
<td>Execute every three hours: 3am, 6am, 9am, noon, 3pm, 6pm, 9pm. Same as previous.</td>
</tr>
<tr>
<td><code>crontab(minute=0, hour=[0,3,6,9,12,15,18,21])</code></td>
<td>Same as previous.</td>
</tr>
<tr>
<td><code>crontab(minute=&quot;*/15&quot;)</code></td>
<td>Execute every 15 minutes.</td>
</tr>
<tr>
<td><code>crontab(day_of_week=&quot;sunday&quot;)</code></td>
<td>Execute every minute (!) at Sundays. Same as previous.</td>
</tr>
<tr>
<td><code>crontab(minute=&quot;*&quot;, hour=&quot;*&quot;, day_of_week=&quot;sun&quot;)</code></td>
<td>Execute every ten minutes, but only between 3-4 am, 5-6 pm and 10-11 pm on Thursdays or Fridays.</td>
</tr>
<tr>
<td><code>crontab(minute=&quot;*/10&quot;, hour=&quot;3,17,22&quot;, day_of_week=&quot;thu,fri&quot;)</code></td>
<td>Execute every even hour, and every hour divisible by three. This means: at every hour \textit{except}: 1am, 5am, 7am, 11am, 1pm, 5pm, 7pm, 11pm. Execute hour divisible by 5. This means that it is triggered at 3pm, not 5pm (since 3pm equals the 24-hour clock value of “15”, which is divisible by 5). Execute every hour divisible by 3, and every hour during office hours (8am-5pm).</td>
</tr>
<tr>
<td><code>crontab(minute=0, hour=&quot;*/2,*/3&quot;)</code></td>
<td>Execute hour divisible by 2.</td>
</tr>
<tr>
<td><code>crontab(minute=0, hour=&quot;*/5&quot;)</code></td>
<td>Execute every five minutes.</td>
</tr>
<tr>
<td><code>crontab(minute=0, hour=&quot;*/3,8-17&quot;)</code></td>
<td>Execute every hour divisible by 3, and every hour during office hours (8am-5pm).</td>
</tr>
</tbody>
</table>

### 2.5.4 Starting celerybeat

To start the \texttt{celerybeat} service:

$ celerybeat

You can also start \texttt{celerybeat} with \texttt{celeryd} by using the -\texttt{B} option, this is convenient if you only intend to use one worker node:

$ celeryd -B

Celerybeat needs to store the last run times of the tasks in a local database file (named \texttt{celerybeat-schedule} by default), so it needs access to write in the current directory, or alternatively you can specify a custom location for this file:

$ celerybeat -s /home/celery/var/run/celerybeat-schedule

\textbf{Note:} To daemonize celerybeat see \textit{Running celeryd as a daemon.}

#### Using custom scheduler classes

Custom scheduler classes can be specified on the command line (the -\texttt{S} argument). The default scheduler is \texttt{celery.beat.PersistentScheduler}, which is simply keeping track of the last run times in a local database file (a shelve).

\texttt{django-celery} also ships with a scheduler that stores the schedule in the Django database:
$ celerybeat -S djcelery.schedulers.DatabaseScheduler

Using django-celery’s scheduler you can add, modify and remove periodic tasks from the Django Admin.

### 2.6 Sets of tasks, Subtasks and Callbacks

- **Subtasks**
  - Callbacks
- **Task Sets**
  - Results
  - Task set callbacks

#### 2.6.1 Subtasks

New in version 2.0.

The `subtask` type is used to wrap the arguments and execution options for a single task invocation:

```python
subtask(task_name_or_cls, args, kwargs, options)
```

For convenience every task also has a shortcut to create subtasks:

```python
task.subtask(args, kwargs, options)
```

`subtask` is actually a `dict` subclass, which means it can be serialized with JSON or other encodings that doesn’t support complex Python objects.

Also it can be regarded as a type, as the following usage works:

```python
>>> s = subtask("tasks.add", args=(2, 2), kwargs={})
>>> subtask(dict(s))  # coerce dict into subtask
```

This makes it excellent as a means to pass callbacks around to tasks.

**Callbacks**

Let’s improve our `add` task so it can accept a callback that takes the result as an argument:

```python
from celery.task import task
from celery.task.sets import subtask

@task
def add(x, y, callback=None):
    result = x + y
    if callback is not None:
        subtask(callback).delay(result)
    return result
```

`subtask` also knows how it should be applied, asynchronously by `delay()`, and eagerly by `apply()`.

The best thing is that any arguments you add to `subtask.delay`, will be prepended to the arguments specified by the subtask itself!
If you have the subtask:

```python
>>> add.subtask(args=(10, ))
```

`subtask.delay(result)` becomes:

```python
>>> add.apply_async(args=(result, 10))
```

... 

Now let’s execute our new `add` task with a callback:

```python
>>> add.delay(2, 2, callback=add.subtask((8, )))
```

As expected this will first launch one task calculating $2 + 2$, then another task calculating $4 + 8$.

### 2.6.2 Task Sets

The `TaskSet` enables easy invocation of several tasks at once, and is then able to join the results in the same order as the tasks were invoked.

A task set takes a list of `subtask`’s:

```python
>>> from celery.task.sets import TaskSet
>>> from tasks import add

>>> job = TaskSet(tasks=[
...     add.subtask((4, 4)),
...     add.subtask((8, 8)),
...     add.subtask((16, 16)),
...     add.subtask((32, 32)),
... ])

>>> result = job.apply_async()

>>> result.ready()  # have all subtasks completed?
True
>>> result.successful()  # were all subtasks successful?
True
>>> result.join()
[4, 8, 16, 32, 64]
```

## Results

When a `TaskSet` is applied it returns a `TaskSetResult` object. `TaskSetResult` takes a list of `AsyncResult` instances and operates on them as if it was a single task.

It supports the following operations:

- `successful()`
  - Returns `True` if all of the subtasks finished successfully (e.g. did not raise an exception).
- `failed()`
  - Returns `True` if any of the subtasks failed.
- `waiting()`
  - Returns `True` if any of the subtasks is not ready yet.
• `ready()`
  Return `True` if all of the subtasks are ready.

• `completed_count()`
  Returns the number of completed subtasks.

• `revoke()`
  Revokes all of the subtasks.

• `iterate()`
  Iterates over the return values of the subtasks as they finish, one by one.

• `join()`
  Gather the results for all of the subtasks and return a list with them ordered by the order of which they were called.

**Task set callbacks**

Simple, but may take a long time before your callback is called:

```python
from celery import current_app
from celery.task import subtask

def join_taskset(setid, subtasks, callback, interval=15, max_retries=None):
    result = TaskSetResult(setid, subtasks)
    if result.ready():
        return subtask(callback).delay(result.join())
    join_taskset.retry(countdown=interval, max_retries=max_retries)
```

Using Redis and atomic counters:

```python
from celery import current_app
from celery.task import Task, TaskSet
from celery.result import TaskSetResult
from celery.utils import gen_unique_id, cached_property
from redis import Redis
from time import sleep

class supports_taskset_callback(Task):
    abstract = True
    accept_magic_kwargs = False

    def after_return(self, *args, **kwargs):
        if self.request.taskset:
            callback = self.request.kwargs.get("callback")
            if callback:
                setid = self.request.taskset
                # task set must be saved in advance, so the task doesn’t
                # try to restore it before that happens. This is why we
                # use the 'apply_presaved_taskset' below.
                result = TaskSetResult.restore(setid)
                current = self.redis.incr("taskset-" + setid)
                if current >= result.total:
                    r = subtask(callback).delay(result.join())

@cached_property
```

2.6. Sets of tasks, Subtasks and Callbacks
def redis(self):
    return Redis(host="localhost", port=6379)

@task(base=supports_taskset_callback)
def add(x, y, \*\*kwargs):
    return x + y

@task
def sum_of(numbers):
    print("TASKSET READY: %r" % (sum(numbers), ))

def apply_presaved_taskset(tasks):
    r = []
    setid = gen_unique_id()
    for task in tasks:
        uuid = gen_unique_id()
        task.options["task_id"] = uuid
        r.append((task, current_appAsyncResult(uuid)))
    ts = current_app.TaskSetResult(setid, [task[1] for task in r])
    ts.save()
    return TaskSet(task[0] for task in r).apply_async(taskset_id=setid)

    # sum of 100 add tasks
result = apply_presaved_taskset(
    add.subtask((i, i), {"callback": sum_of.subtask()})
    for i in xrange(100))

2.7 HTTP Callback Tasks (Webhooks)

- Basics
- Django webhook example
- Ruby on Rails webhook example
- Executing webhook tasks

2.7.1 Basics

If you need to call into another language, framework or similar, you can do so by using HTTP callback tasks.

The HTTP callback tasks uses GET/POST data to pass arguments and returns result as a JSON response. The scheme to call a task is:

GET http://example.com/mytask/?arg1=a&arg2=b&arg3=c

or using POST:

POST http://example.com/mytask

Note: POST data needs to be form encoded.

Whether to use GET or POST is up to you and your requirements.

The web page should then return a response in the following format if the execution was successful:
or if there was an error:

{"status": "failure", "reason": "Invalid moon alignment."}

2.7.2 Django webhook example

With this information you could define a simple task in Django:

```python
from django.http import HttpResponse
from anyjson import serialize

def multiply(request):
x = int(request.GET["x"])  
y = int(request.GET["y"])  
result = x * y
response = {"status": "success", "retval": result}
return HttpResponse(serialize(response), mimetype="application/json")
```

2.7.3 Ruby on Rails webhook example

or in Ruby on Rails:

```ruby
def multiply
  @x = params[":x"].to_i
  @y = params[":y"].to_i

  @status = {
    :status => "success",
    :retval => @x * @y
  }

  render :json => @status
end
```

You can easily port this scheme to any language/framework; new examples and libraries are very welcome.

2.7.4 Executing webhook tasks

To execute the task you use the `URL` class:

```python
>>> from celery.task.http import URL
>>> res = URL("http://example.com/multiply").get_async(x=10, y=10)
```

URL is a shortcut to the `HttpDispatchTask`. You can subclass this to extend the functionality.

```python
>>> from celery.task.http import HttpDispatchTask
>>> res = HttpDispatchTask.delay(url="http://example.com/multiply", method="GET", x=10, y=10)
>>> res.get()
100
```

The output of `celeryd` (or the log file if enabled) should show the task being executed:

```plaintext
```

2.7. HTTP Callback Tasks (Webhooks)
Since applying tasks can be done via HTTP using the `djcelery.views.apply` view, executing tasks from other languages is easy. For an example service exposing tasks via HTTP you should have a look at `examples/celery_http_gateway` in the Celery distribution: http://github.com/ask/celery/tree/master/examples/celery_http_gateway/

### 2.8 Routing Tasks

**Warning:** This document refers to functionality only available in brokers using AMQP. Other brokers may implement some functionality, see their respective documentation for more information, or contact the Mailing list.

- Basics
  - Automatic routing
    * Changing the name of the default queue
    * How the queues are defined
  - Manual routing
- AMQP Primer
  - Messages
  - Producers, consumers and brokers
  - Exchanges, queues and routing keys.
  - Exchange types
    * Direct exchanges
    * Topic exchanges
  - Related API commands
  - Hands-on with the API
- Routing Tasks
  - Defining queues
  - Specifying task destination
  - Routers

### 2.8.1 Basics

**Automatic routing**

The simplest way to do routing is to use the `CELERY_CREATE_MISSING_QUEUES` setting (on by default).

With this setting on, a named queue that is not already defined in `CELERY_QUEUES` will be created automatically. This makes it easy to perform simple routing tasks.

Say you have two servers, `x`, and `y` that handles regular tasks, and one server `z`, that only handles feed related tasks. You can use this configuration:

```python
CELERY_ROUTES = {"feed.tasks.import_feed": {"queue": "feeds"}}
```

With this route enabled import feed tasks will be routed to the "feeds" queue, while all other tasks will be routed to the default queue (named “celery” for historical reasons).

Now you can start server `z` to only process the feeds queue like this:

```shell
(z)$ celeryd -Q feeds
```

You can specify as many queues as you want, so you can make this server process the default queue as well:
(z)$ celeryd -Q feeds,celery

Changing the name of the default queue

You can change the name of the default queue by using the following configuration:

```
CELERY_QUEUES = {"default": {"exchange": "default",
                      "binding_key": "default"}}
CELERY_DEFAULT_QUEUE = "default"
```

How the queues are defined

The point with this feature is to hide the complex AMQP protocol for users with only basic needs. However – you may still be interested in how these queues are declared.

A queue named “video” will be created with the following settings:

```
{"exchange": "video",
 "exchange_type": "direct",
 "routing_key": "video"}
```

The non-AMQP backends like `ghettoq` does not support exchanges, so they require the exchange to have the same name as the queue. Using this design ensures it will work for them as well.

Manual routing

Say you have two servers, $x$ and $y$ that handles regular tasks, and one server $z$, that only handles feed related tasks, you can use this configuration:

```
CELERY_DEFAULT_QUEUE = "default"
CELERY_QUEUES = {
    "default": {
        "binding_key": "task.#",
    },
    "feed_tasks": {
        "binding_key": "feed.#",
    },
}
CELERY_DEFAULT_EXCHANGE = "tasks"
CELERY_DEFAULT_EXCHANGE_TYPE = "topic"
CELERY_DEFAULT_ROUTING_KEY = "task.default"
```

`CELERY_QUEUES` is a map of queue names and their exchange/type/binding_key, if you don’t set exchange or exchange type, they will be taken from the `CELERY_DEFAULT_EXCHANGE` and `CELERY_DEFAULT_EXCHANGE_TYPE` settings.

To route a task to the `feed_tasks` queue, you can add an entry in the `CELERY_ROUTES` setting:

```
CELERY_ROUTES = {
    "feeds.tasks.import_feed": {
        "queue": "feed_tasks",
        "routing_key": "feed.import",
    },
}
```
You can also override this using the `routing_key` argument to `apply_async()`, or `send_task()`:

```python
>>> from feeds.tasks import import_feed
>>> import_feed.apply_async(args=["http://cnn.com/rss"],
... queue="feed_tasks",
... routing_key="feed.import")
```

To make server z consume from the feed queue exclusively you can start it with the `-Q` option:

```bash
(z)$ celeryd -Q feed_tasks --hostname=z.example.com
```

Servers x and y must be configured to consume from the default queue:

```bash
(x)$ celeryd -Q default --hostname=x.example.com
(y)$ celeryd -Q default --hostname=y.example.com
```

If you want, you can even have your feed processing worker handle regular tasks as well, maybe in times when there’s a lot of work to do:

```bash
(z)$ celeryd -Q feed_tasks,default --hostname=z.example.com
```

If you have another queue but on another exchange you want to add, just specify a custom exchange and exchange type:

```python
CELERY_QUEUES = {
    "feed_tasks": {
        "binding_key": "feed.#",
    },
    "regular_tasks": {
        "binding_key": "task.#",
    },
    "image_tasks": {
        "binding_key": "image.compress",
        "exchange": "mediatasks",
        "exchange_type": "direct",
    },
}
```

If you’re confused about these terms, you should read up on AMQP.

See also:

In addition to the AMQP Primer below, there’s Rabbits and Warrens, an excellent blog post describing queues and exchanges. There’s also AMQP in 10 minutes*: Flexible Routing Model, and Standard Exchange Types. For users of RabbitMQ the RabbitMQ FAQ could be useful as a source of information.

### 2.8.2 AMQP Primer

#### Messages

A message consists of headers and a body. Celery uses headers to store the content type of the message and its content encoding. The content type is usually the serialization format used to serialize the message. The body contains the name of the task to execute, the task id (UUID), the arguments to execute it with and some additional metadata – like the number of retries or an ETA.

This is an example task message represented as a Python dictionary:
Producers, consumers and brokers

The client sending messages is typically called a publisher, or a producer, while the entity receiving messages is called a consumer.

The broker is the message server, routing messages from producers to consumers.

You are likely to see these terms used a lot in AMQP related material.

Exchanges, queues and routing keys.

1. Messages are sent to exchanges.
2. An exchange routes messages to one or more queues. Several exchange types exists, providing different ways to do routing, or implementing different messaging scenarios.
3. The message waits in the queue until someone consumes it.
4. The message is deleted from the queue when it has been acknowledged.

The steps required to send and receive messages are:

1. Create an exchange
2. Create a queue
3. Bind the queue to the exchange.

Celery automatically creates the entities necessary for the queues in CELERY_QUEUES to work (except if the queue’s auto_declare setting is set to False).

Here’s an example queue configuration with three queues; One for video, one for images and one default queue for everything else:

```python
CELERY_QUEUES = {
    "default": {
        "exchange": "default",
        "binding_key": "default"},
    "videos": {
        "exchange": "media",
        "binding_key": "media.video"},
    "images": {
        "exchange": "media",
        "binding_key": "media.image"},
}

CELERY_DEFAULT_QUEUE = "default"
CELERY_DEFAULT_EXCHANGE_TYPE = "direct"
CELERY_DEFAULT_ROUTING_KEY = "default"
```

**Note:** In Celery the routing key is the key used to send the message, while binding key is the key the queue is bound with. In the AMQP API they are both referred to as the routing key.
**Exchange types**

The exchange type defines how the messages are routed through the exchange. The exchange types defined in the standard are direct, topic, fanout and headers. Also non-standard exchange types are available as plug-ins to RabbitMQ, like the last-value-cache plug-in by Michael Bridgen.

**Direct exchanges**

Direct exchanges match by exact routing keys, so a queue bound by the routing key video only receives messages with that routing key.

**Topic exchanges**

Topic exchanges matches routing keys using dot-separated words, and the wildcard characters: * (matches a single word), and # (matches zero or more words).

With routing keys like usa.news, usa.weather, norway.news and norway.weather, bindings could be *.news (all news), usa.# (all items in the USA) or usa.weather (all USA weather items).

**Related API commands**

- `exchange.declare(exchange_name, type, passive, durable, auto_delete, internal)`
  Declares an exchange by name.

  **Parameters**
  - passive – Passive means the exchange won’t be created, but you can use this to check if the exchange already exists.
  - durable – Durable exchanges are persistent. That is - they survive a broker restart.
  - auto_delete – This means the queue will be deleted by the broker when there are no more queues using it.

- `queue.declare(queue_name, passive, durable, exclusive, auto_delete)`
  Declares a queue by name.

  Exclusive queues can only be consumed from by the current connection. Exclusive also implies auto_delete.

- `queue.bind(queue_name, exchange_name, routing_key)`
  Binds a queue to an exchange with a routing key. Unbound queues will not receive messages, so this is necessary.

- `queue.delete(name, if_unused=False, if_empty=False)`
  Deletes a queue and its binding.

- `exchange.delete(name, if_unused=False)`
  Deletes an exchange.

**Note:** Declaring does not necessarily mean “create”. When you declare you assert that the entity exists and that it’s operable. There is no rule as to whom should initially create the exchange/queue(binding, whether consumer or producer. Usually the first one to need it will be the one to create it.
Hands-on with the API

Celery comes with a tool called camqadm (short for Celery AMQ Admin). It’s used for command-line access to the AMQP API, enabling access to administration tasks like creating/deleting queues and exchanges, purging queues or sending messages.

You can write commands directly in the arguments to camqadm, or just start with no arguments to start it in shell-mode:

```bash
$ camqadm
-> connecting to amqp://guest@localhost:5672/.
-> connected.
1>
```

Here 1> is the prompt. The number 1, is the number of commands you have executed so far. Type help for a list of commands available. It also supports auto-completion, so you can start typing a command and then hit the tab key to show a list of possible matches.

Let’s create a queue we can send messages to:

1> exchange.declare testexchange direct
ok.
2> queue.declare testqueue
ok. queue:testqueue messages:0 consumers:0.
3> queue.bind testqueue testexchange testkey
ok.

This created the direct exchange testexchange, and a queue named testqueue. The queue is bound to the exchange using the routing key testkey.

From now on all messages sent to the exchange testexchange with routing key testkey will be moved to this queue. We can send a message by using the basic.publish command:

4> basic.publish "This is a message!" testexchange testkey
ok.

Now that the message is sent we can retrieve it again. We use the basic.get` command here, which polls for new messages on the queue.

Pop a message off the queue:

5> basic.get testqueue
{'body': 'This is a message!',
 'delivery_info': {'delivery_tag': 1,
 'exchange': u'testexchange',
 'message_count': 0,
 'redelivered': False,
 'routing_key': u'testkey'},
 'properties': {}}

AMQP uses acknowledgment to signify that a message has been received and processed successfully. If the message has not been acknowledged and consumer channel is closed, the message will be delivered to another consumer.

Note the delivery tag listed in the structure above; Within a connection channel, every received message has a unique delivery tag. This tag is used to acknowledge the message. Also note that delivery tags are not unique across connections, so in another client the delivery tag / might point to a different message than in this channel.

You can acknowledge the message we received using basic.ack:

6> basic.ack 1
ok.
To clean up after our test session we should delete the entities we created:

7> queue.delete testqueue
ok. 0 messages deleted.
8> exchange.delete testexchange
ok.

### 2.8.3 Routing Tasks

#### Defining queues

In Celery available queues are defined by the `CELERY_QUEUES` setting.

Here’s an example queue configuration with three queues; One for video, one for images and one default queue for everything else:

```python
CELERY_QUEUES = {
    "default": {
        "exchange": "default",
        "binding_key": "default"},
    "videos": {
        "exchange": "media",
        "exchange_type": "topic",
        "binding_key": "media.video"},
    "images": {
        "exchange": "media",
        "exchange_type": "topic",
        "binding_key": "media.image"},
}
CELERY_DEFAULT_QUEUE = "default"
CELERY_DEFAULT_EXCHANGE = "default"
CELERY_DEFAULT_EXCHANGE_TYPE = "direct"
CELERY_DEFAULT_ROUTING_KEY = "default"
```

Here, the `CELERY_DEFAULT_QUEUE` will be used to route tasks that doesn’t have an explicit route.

The default exchange, exchange type and routing key will be used as the default routing values for tasks, and as the default values for entries in `CELERY_QUEUES`.

#### Specifying task destination

The destination for a task is decided by the following (in order):

1. The `Routers` defined in `CELERY_ROUTES`.
2. The routing arguments to `apply_async()`.
3. Routing related attributes defined on the `Task` itself.

It is considered best practice to not hard-code these settings, but rather leave that as configuration options by using `Routers`; This is the most flexible approach, but sensible defaults can still be set as task attributes.

#### Routers

A router is a class that decides the routing options for a task.
All you need to define a new router is to create a class with a `route_for_task` method:

```python
class MyRouter(object):
    def route_for_task(self, task, args=None, kwargs=None):
        if task == "myapp.tasks.compress_video":
            return {
                "exchange": "video",
                "exchange_type": "topic",
                "routing_key": "video.compress"
            }
        return None
```

If you return the `queue` key, it will expand with the defined settings of that queue in `CELERY_QUEUES`:

```python
{"queue": "video", "routing_key": "video.compress"}
```

becomes -->

```python
{"queue": "video",
 "exchange": "video",
 "exchange_type": "topic",
 "routing_key": "video.compress"}
```

You install router classes by adding them to the `CELERY_ROUTES` setting:

```python
CELERY_ROUTES = (MyRouter(), )
```

Router classes can also be added by name:

```python
CELERY_ROUTES = ("myapp.routers.MyRouter", )
```

For simple task name -> route mappings like the router example above, you can simply drop a dict into `CELERY_ROUTES` to get the same behavior:

```python
CELERY_ROUTES = ("myapp.tasks.compress_video": {
    "queue": "video",
    "routing_key": "video.compress"
},)
```

The routers will then be traversed in order, it will stop at the first router returning a true value, and use that as the final route for the task.

### 2.9 Monitoring and Management Guide
2.9.1 Introduction

There are several tools available to monitor and inspect Celery clusters.

This document describes some of these, as as well as features related to monitoring, like events and broadcast commands.

2.9.2 Workers

celeryctl: Management Utility

New in version 2.1.

celeryctl is a command line utility to inspect and manage worker nodes (and to some degree tasks).

To list all the commands available do:

$ celeryctl help

or to get help for a specific command do:

$ celeryctl <command> --help

Commands

- **status**: List active nodes in this cluster
  
  $ celeryctl status

- **result**: Show the result of a task
Note that you can omit the name of the task as long as the task doesn’t use a custom result backend.

- **purge**: Purge messages from all configured task queues.
  
  ```
  $ celeryctl purge
  
  **Warning**: There is no undo for this operation, and messages will be permanently deleted!
  ```

- **inspect active**: List active tasks
  
  ```
  $ celeryctl inspect active
  
  These are all the tasks that are currently being executed.
  ```

- **inspect scheduled**: List scheduled ETA tasks
  
  ```
  $ celeryctl inspect scheduled
  
  These are tasks reserved by the worker because they have the `eta` or `countdown` argument set.
  ```

- **inspect reserved**: List reserved tasks
  
  ```
  $ celeryctl inspect reserved
  
  This will list all tasks that have been prefetched by the worker, and is currently waiting to be executed (does not include tasks with an eta).
  ```

- **inspect revoked**: List history of revoked tasks
  
  ```
  $ celeryctl inspect revoked
  ```

- **inspect registered_tasks**: List registered tasks
  
  ```
  $ celeryctl inspect registered_tasks
  ```

- **inspect stats**: Show worker statistics
  
  ```
  $ celeryctl inspect stats
  ```

- **inspect enable_events**: Enable events
  
  ```
  $ celeryctl inspect enable_events
  ```

- **inspect disable_events**: Disable events
  
  ```
  $ celeryctl inspect disable_events
  ```

**Note**: All `inspect` commands supports a `--timeout` argument. This is the number of seconds to wait for responses. You may have to increase this timeout if you’re not getting a response due to latency.

### Specifying destination nodes

By default the `inspect` commands operates on all workers. You can specify a single, or a list of workers by using the `--destination` argument:
Django Admin Monitor

New in version 2.1.

When you add django-celery to your Django project you will automatically get a monitor section as part of the Django admin interface.

This can also be used if you’re not using Celery with a Django project.

Screenshot

Starting the monitor

The Celery section will already be present in your admin interface, but you won’t see any data appearing until you start the snapshot camera.

The camera takes snapshots of the events your workers sends at regular intervals, storing them in your database (See Snapshots).

To start the camera run:

$ python manage.py celerycam

If you haven’t already enabled the sending of events you need to do so:

$ python manage.py celeryctl inspect enable_events

Tip You can enable events when the worker starts using the -E argument to celeryd.
Now that the camera has been started, and events have been enabled you should be able to see your workers and the tasks in the admin interface (it may take some time for workers to show up).

The admin interface shows tasks, worker nodes, and even lets you perform some actions, like revoking and rate limiting tasks, or shutting down worker nodes.

**Shutter frequency**

By default the camera takes a snapshot every second, if this is too frequent or you want to have higher precision, then you can change this using the `--frequency` argument. This is a float describing how often, in seconds, it should wake up to check if there are any new events:

```bash
$ python manage.py celerycam --frequency=3.0
```

The camera also supports rate limiting using the `--maxrate` argument. While the frequency controls how often the camera thread wakes up, the rate limit controls how often it will actually take a snapshot.

The rate limits can be specified in seconds, minutes or hours by appending `/s`, `/m` or `/h` to the value. Example: `--maxrate=100/m`, means “hundred writes a minute”.

The rate limit is off by default, which means it will take a snapshot for every `--frequency` seconds.

The events also expire after some time, so the database doesn’t fill up. Successful tasks are deleted after 1 day, failed tasks after 3 days, and tasks in other states after 5 days.

**Using outside of Django**

*django-celery* also installs the *djcelerymon* program. This can be used by non-Django users, and runs both a web server and a snapshot camera in the same process.

**Installing**

Using *pip*:

```
$ pip install -U django-celery
```

or using *easy_install*:

```
$ easy_install -U django-celery
```

**Running**

*djcelerymon* reads configuration from your Celery configuration module, and sets up the Django environment using the same settings:

```
$ djcelerymon
```

Database tables will be created the first time the monitor is run. By default an *sqlite3* database file named *djcelerymon.db* is used, so make sure this file is writeable by the user running the monitor.

If you want to store the events in a different database, e.g. MySQL, then you can configure the *DATABASE* settings directly in your Celery config module. See [http://docs.djangoproject.com/en/dev/ref/settings/#databases](http://docs.djangoproject.com/en/dev/ref/settings/#databases) for more information about the database options available.

You will also be asked to create a superuser (and you need to create one to be able to log into the admin later):

```
Creating table auth_permission
Creating table auth_group_permissions
[...]
```
You just installed Django’s auth system, which means you don’t have any superusers defined. Would you like to create one now? (yes/no): yes
Username (Leave blank to use ‘username’): username
E-mail address: me@example.com
Password: *******
Password (again): *******
Superuser created successfully.

[...]
Django version 1.2.1, using settings ‘celeryconfig’
Development server is running at http://127.0.0.1:8000/
Quit the server with CONTROL-C.

Now that the service is started you can visit the monitor at http://127.0.0.1:8000, and log in using the user you created.

For a list of the command line options supported by `djcelerymon`, please see `djcelerymon --help`.

**celeryev: Curses Monitor**

New in version 2.0.

`celeryev` is a simple curses monitor displaying task and worker history. You can inspect the result and traceback of tasks, and it also supports some management commands like rate limiting and shutting down workers.
celeryev is also used to start snapshot cameras (see Snapshots:

$ celeryev --camera=<camera-class> --frequency=1.0

and it includes a tool to dump events to stdout:

$ celeryev --dump

For a complete list of options use --help:

$ celeryev --help

celerymon: Web monitor

celerymon is the ongoing work to create a web monitor. It’s far from complete yet, and does currently only support a JSON API. Help is desperately needed for this project, so if you, or someone you know would like to contribute templates, design, code or help this project in any way, please get in touch!

Tip The Django admin monitor can be used even though you’re not using Celery with a Django project. See Using outside of Django.

2.9.3 RabbitMQ

To manage a Celery cluster it is important to know how RabbitMQ can be monitored.

RabbitMQ ships with the rabbitmqctl(1) command, with this you can list queues, exchanges, bindings, queue lengths, the memory usage of each queue, as well as manage users, virtual hosts and their permissions.

**Note:** The default virtual host ("/") is used in these examples, if you use a custom virtual host you have to add the -p argument to the command, e.g: rabbitmqctl list_queues -p my_vhost ....

Inspecting queues

Finding the number of tasks in a queue:

$ rabbitmqctl list_queues name messages messages_ready \  
  messages_unacknowledged

Here messages ready is the number of messages ready for delivery (sent but not received), messages_unacknowledged is the number of messages that has been received by a worker but not acknowledged yet (meaning it is in progress, or has been reserved). messages is the sum of ready and unacknowledged messages.

Finding the number of workers currently consuming from a queue:

$ rabbitmqctl list_queues name consumers

Finding the amount of memory allocated to a queue:

$ rabbitmqctl list_queues name memory

  Tip Adding the -q option to rabbitmqctl(1) makes the output easier to parse.
2.9.4 Munin

This is a list of known Munin plug-ins that can be useful when maintaining a Celery cluster.

- **rabbitmq-munin**: Munin plug-ins for RabbitMQ.
  
  http://github.com/ask/rabbitmq-munin

- **celery_tasks**: Monitors the number of times each task type has been executed (requires `celerymon`).
  

- **celery_task_states**: Monitors the number of tasks in each state (requires `celerymon`).
  
  http://exchange.munin-monitoring.org/plugins/celery_tasks/details

2.9.5 Events

The worker has the ability to send a message whenever some event happens. These events are then captured by tools like `celerymon` and `celeryev` to monitor the cluster.

Snapshots

Even a single worker can produce a huge amount of events, so storing the history of all events on disk may be very expensive.

A sequence of events describes the cluster state in that time period, by taking periodic snapshots of this state we can keep all history, but still only periodically write it to disk.

To take snapshots you need a Camera class, with this you can define what should happen every time the state is captured; You can write it to a database, send it by e-mail or something else entirely.

`celeryev` is then used to take snapshots with the camera, for example if you want to capture state every 2 seconds using the camera `myapp.Camera` you run `celeryev` with the following arguments:

```
$ celeryev -c myapp.Camera --frequency=2.0
```

Custom Camera

Here is an example camera, dumping the snapshot to screen:

```python
from pprint import pformat
from celery.events.snapshot import Polaroid

class DumpCam(Polaroid):
    def shutter(self, state):
        if not state.event_count:
            # No new events since last snapshot.
            return
        print("Workers: %s" % (pformat(state.workers, indent=4), ))
        print("Tasks: %s" % (pformat(state.tasks, indent=4), ))
        print("Total: %s events, %s tasks" %
            (state.event_count, state.task_count))
```
See the API reference for `celery.events.state` to read more about state objects.

Now you can use this cam with `celeryev` by specifying it with the `-c` option:

```bash
$ celeryev -c myapp.DumpCam --frequency=2.0
```

Or you can use it programmatically like this:

```python
from celery.events import EventReceiver
from celery.messaging import establish_connection
from celery.events.state import State
from myapp import DumpCam

def main():
    state = State()
    with establish_connection() as connection:
        recv = EventReceiver(connection, handlers={"*": state.event})
        with DumpCam(state, freq=1.0):
            recv.capture(limit=None, timeout=None)

if __name__ == "__main__":
    main()
```

### Event Reference

This list contains the events sent by the worker, and their arguments.

#### Task Events

- **task-received**(uuid, name, args, kwargs, retries, eta, hostname, timestamp)
  
  Sent when the worker receives a task.

- **task-started**(uuid, hostname, timestamp, pid)
  
  Sent just before the worker executes the task.

- **task-succeeded**(uuid, result, runtime, hostname, timestamp)
  
  Sent if the task executed successfully.

  Runtime is the time it took to execute the task using the pool. (Starting from the task is sent to the worker pool, and ending when the pool result handler callback is called).

- **task-failed**(uuid, exception, traceback, hostname, timestamp)
  
  Sent if the execution of the task failed.

- **task-revoked**(uuid)
  
  Sent if the task has been revoked (Note that this is likely to be sent by more than one worker).

- **task-retried**(uuid, exception, traceback, hostname, timestamp)
  
  Sent if the task failed, but will be retried in the future.

#### Worker Events

- **worker-online**(hostname, timestamp, sw_ident, sw_ver, sw_sys)
The worker has connected to the broker and is online.

- **sw_ident**: Name of worker software (e.g. celeryd).
- **sw_ver**: Software version (e.g. 2.2.0).
- **sw_sys**: Operating System (e.g. Linux, Windows, Darwin).

- worker-heartbeat(hostname, timestamp, sw_ident, sw_ver, sw_sys)
  
  Sent every minute, if the worker has not sent a heartbeat in 2 minutes, it is considered to be offline.

- worker-offline(hostname, timestamp, sw_ident, sw_ver, sw_sys)
  
  The worker has disconnected from the broker.

### 2.10 Optimizing

#### 2.10.1 Introduction

The default configuration makes a lot of compromises. It’s not optimal for any single case, but works well enough for most situations.

There are optimizations that can be applied based on specific use cases.

Optimizations can apply to different properties of the running environment, be it the time tasks take to execute, the amount of memory used, or responsiveness at times of high load.

#### 2.10.2 Ensuring Operations

In the book *Programming Pearls*, Jon Bentley presents the concept of back-of-the-envelope calculations by asking the question;

> How much water flows out of the Mississippi River in a day?

The point of this exercise[*] is to show that there is a limit to how much data a system can process in a timely manner. Back of the envelope calculations can be used as a means to plan for this ahead of time.

In Celery; If a task takes 10 minutes to complete, and there are 10 new tasks coming in every minute, the queue will never be empty. This is why it’s very important that you monitor queue lengths!

A way to do this is by using *Munin*. You should set up alerts, that will notify you as soon as any queue has reached an unacceptable size. This way you can take appropriate action like adding new worker nodes, or revoking unnecessary tasks.

#### 2.10.3 Worker Settings

**Prefetch Limits**

*Prefetch* is a term inherited from AMQP that is often misunderstood by users.

The prefetch limit is a **limit** for the number of tasks (messages) a worker can reserve for itself. If it is zero, the worker will keep consuming messages, not respecting that there may be other available worker nodes that may be able to process them sooner[#], or that the messages may not even fit in memory.

The workers’ default prefetch count is the `CELERYD_PREFETCH_MULTIPLIER` setting multiplied by the number of child worker processes[#].
If you have many tasks with a long duration you want the multiplier value to be 1, which means it will only reserve one task per worker process at a time.

However – If you have many short-running tasks, and throughput/roundtrip latency[#] is important to you, this number should be large. The worker is able to process more tasks per second if the messages have already been prefetched, and is available in memory. You may have to experiment to find the best value that works for you. Values like 50 or 150 might make sense in these circumstances. Say 64, or 128.

If you have a combination of long- and short-running tasks, the best option is to use two worker nodes that are configured separately, and route the tasks according to the run-time. (see Routing Tasks).

**Reserve one task at a time**

When using early acknowledgement (default), a prefetch multiplier of 1 means the worker will reserve at most one extra task for every active worker process.

When users ask if it’s possible to disable “prefetching of tasks”, often what they really want is to have a worker only reserve as many tasks as there are child processes.

But this is not possible without enabling late acknowledgements: A task that has been started, will be retried if the worker crashes mid execution so the task must be idempotent (see also notes at Should I use retry or acks_late?).

You can enable this behavior by using the following configuration options:

```
CELERY_ACKS_LATE = True
CELERYD_PREFETCH_MULTIPLIER = 1
```

**Rate Limits**

The system responsible for enforcing rate limits introduces some overhead, so if you’re not using rate limits it may be a good idea to disable them completely. This will disable one thread, and it won’t spend as many CPU cycles when the queue is inactive.

Set the `CELERY_DISABLE_RATE_LIMITS` setting to disable the rate limit subsystem:

```
CELERY_DISABLE_RATE_LIMITS = True
```

## 2.11 Concurrency

**Release** 2.2

**Date** February 04, 2014

### 2.11.1 Concurrency with Eventlet

**Introduction**

The Eventlet homepage describes it as; A concurrent networking library for Python that allows you to change how you run your code, not how you write it.

- It uses epoll(4) or libevent for highly scalable non-blocking I/O.
- Coroutines ensure that the developer uses a blocking style of programming that is similar to threading, but provide the benefits of non-blocking I/O.
• The event dispatch is implicit, which means you can easily use Eventlet from the Python interpreter, or as a small part of a larger application.

Celery supports Eventlet as an alternative execution pool implementation. It is in some cases superior to multiprocessing, but you need to ensure your tasks do not perform blocking calls, as this will halt all other operations in the worker until the blocking call returns.

The multiprocessing pool can take use of multiple processes, but how many is often limited to a few processes per CPU. With Eventlet you can efficiently spawn hundreds, or thousands of green threads. In an informal test with a feed hub system the Eventlet pool could fetch and process hundreds of feeds every second, while the multiprocessing pool spent 14 seconds processing 100 feeds. Note that is one of the applications evented I/O is especially good at (asynchronous HTTP requests). You may want a a mix of both Eventlet and multiprocessing workers, and route tasks according to compatibility or what works best.

**Enabling Eventlet**

You can enable the Eventlet pool by using the `-P` option to `celeryd`:

```
$ celeryd -P eventlet -c 1000
```

**Examples**

See the [Eventlet examples](#) directory in the Celery distribution for some examples taking use of Eventlet support.
This document describes the configuration options available.
If you’re using the default loader, you must create the `celeryconfig.py` module and make sure it is available on the Python path.

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### 3.1 Example configuration file

This is an example configuration file to get you started. It should contain all you need to run a basic Celery set-up.

```python
# List of modules to import when celery starts.
CELERY_IMPORTS = ("myapp.tasks", )

## Result store settings.
CELERY_RESULT_BACKEND = "database"
CELERY_RESULT_DBURI = "sqlite:///mydatabase.db"
```
## Broker settings.
BROKER_HOST = "localhost"
BROKER_PORT = 5672
BROKER_VHOST = "/
BROKER_USER = "guest"
BROKER_PASSWORD = "guest"

## Worker settings
## If you’re doing mostly I/O you can have more processes,
## but if mostly spending CPU, try to keep it close to the
## number of CPUs on your machine. If not set, the number of CPUs/cores
## available will be used.
CELERYD_CONCURRENCY = 10
# CELERYD_LOG_FILE = "celeryd.log"
# CELERYD_LOG_LEVEL = "INFO"

### 3.2 Configuration Directives

#### 3.2.1 Concurrency settings

**CELERYD_CONCURRENCY**

The number of concurrent worker processes/threads/green threads, executing tasks.

Defaults to the number of available CPUs.

**CELERYD_PREFETCH_MULTIPLIER**

How many messages to prefetch at a time multiplied by the number of concurrent processes. The default is 4 (four messages for each process). The default setting is usually a good choice, however – if you have very long running tasks waiting in the queue and you have to start the workers, note that the first worker to start will receive four times the number of messages initially. Thus the tasks may not be fairly distributed to the workers.

#### 3.2.2 Task result backend settings

**CELERY_RESULT_BACKEND**

The backend used to store task results (tombstones). Can be one of the following:

- **database** (default) Use a relational database supported by SQLAlchemy. See Database backend settings.
- **cache** Use memcached to store the results. See Cache backend settings.
- **mongodb** Use MongoDB to store the results. See MongoDB backend settings.
- **redis** Use Redis to store the results. See Redis backend settings.
- **tyrant** Use Tokyo Tyrant to store the results. See Tokyo Tyrant backend settings.
- **amqp** Send results back as AMQP messages See AMQP backend settings.
3.2.3 Database backend settings

**CELERY_RESULT_DBURI**

Please see Supported Databases for a table of supported databases. To use this backend you need to configure it with an Connection String, some examples include:

- # sqlite (filename)
  
  ```
  CELERY_RESULT_DBURI = "sqlite:///celerydb.sqlite"
  ```

- # mysql
  
  ```
  CELERY_RESULT_DBURI = "mysql://scott:tiger@localhost/foo"
  ```

- # postgresql
  
  ```
  CELERY_RESULT_DBURI = "postgresql://scott:tiger@localhost/mydatabase"
  ```

- # oracle
  
  ```
  CELERY_RESULT_DBURI = "oracle://scott:tiger@127.0.0.1:1521/sidname"
  ```

See Connection String for more information about connection strings.

**CELERY_RESULT_ENGINE_OPTIONS**

To specify additional SQLAlchemy database engine options you can use the CELERY_RESULT_ENGINE_OPTIONS setting:

- # echo enables verbose logging from SQLAlchemy.
  
  ```
  CELERY_RESULT_ENGINE_OPTIONS = {"echo": True}
  ```

Example configuration

```
CELERY_RESULT_BACKEND = "database"
CELERY_RESULT_DBURI = "mysql://user:password@host/dbname"
```

3.2.4 AMQP backend settings

**CELERY_AMQP_TASK_RESULT_EXPIRES**

The time in seconds of which the task result queues should expire.

**Note:** AMQP result expiration requires RabbitMQ versions 2.1.0 and higher.

**CELERY_AMQP_TASK_RESULT_CONNECTION_MAX**

Maximum number of connections used by the AMQP result backend simultaneously. Default is 1 (a single connection per process).

**CELERY_RESULT_EXCHANGE**

Name of the exchange to publish results in. Default is “celeryresults”.

3.2. Configuration Directives
**CELERY_RESULT_EXCHANGE_TYPE**

The exchange type of the result exchange. Default is to use a *direct* exchange.

**CELERY_RESULT_SERIALIZER**

Result message serialization format. Default is "pickle". See *Serializers*.

**CELERY_RESULT_PERSISTENT**

If set to `True`, result messages will be persistent. This means the messages will not be lost after a broker restart. The default is for the results to be transient.

Example configuration

```python
CELERY_RESULT_BACKEND = "amqp"
CELERY_AMQP_TASK_RESULT_EXPIRES = 18000  # 5 hours.
```

### 3.2.5 Cache backend settings

*Note:* The cache backend supports the pylibmc and python-memcached libraries. The latter is used only if pylibmc is not installed.

**CELERY_CACHE_BACKEND**

Using a single memcached server:

```python
CELERY_CACHE_BACKEND = 'memcached://127.0.0.1:11211/
```

Using multiple memcached servers:

```python
CELERY_RESULT_BACKEND = "cache"
```

The “dummy” backend stores the cache in memory only:

```python
CELERY_CACHE_BACKEND = "dummy"
```

**CELERY_CACHE_BACKEND_OPTIONS**

You can set pylibmc options using the `CELERY_CACHE_BACKEND_OPTIONS` setting:

```python
CELERY_CACHE_BACKEND_OPTIONS = {"binary": True,
                                "behaviors": {"tcp_nodelay": True}}
```
3.2.6 Tokyo Tyrant backend settings

Note: The Tokyo Tyrant backend requires the `pytyrant` library: http://pypi.python.org/pypi/pytyrant/

This backend requires the following configuration directives to be set:

**TT_HOST**

Host name of the Tokyo Tyrant server.

**TT_PORT**

The port the Tokyo Tyrant server is listening to.

**Example configuration**

```
CELERY_RESULT_BACKEND = "tyrant"
TT_HOST = "localhost"
TT_PORT = 1978
```

3.2.7 Redis backend settings

Note: The Redis backend requires the `redis` library: http://pypi.python.org/pypi/redis/0.5.5

To install the redis package use `pip` or `easy_install`:

```
$ pip install redis
```

This backend requires the following configuration directives to be set.

**REDIS_HOST**

Host name of the Redis database server. e.g. `"localhost"`.

**REDIS_PORT**

Port to the Redis database server. e.g. `6379`.

**REDIS_DB**

Database number to use. Default is 0.

**REDIS_PASSWORD**

Password used to connect to the database.
Example configuration

```
CELERY_RESULT_BACKEND = "redis"
REDIS_HOST = "localhost"
REDIS_PORT = 6379
REDIS_DB = 0
REDIS_CONNECT_RETRY = True
```

3.2.8 MongoDB backend settings

Note: The MongoDB backend requires the `pymongo` library: [http://github.com/mongodb/mongo-python-driver/tree/master](http://github.com/mongodb/mongo-python-driver/tree/master)

**CELERY_MONGODB_BACKEND_SETTINGS**

This is a dict supporting the following keys:

- **host** Host name of the MongoDB server. Defaults to “localhost”.
- **port** The port the MongoDB server is listening to. Defaults to 27017.
- **user** User name to authenticate to the MongoDB server as (optional).
- **password** Password to authenticate to the MongoDB server (optional).
- **database** The database name to connect to. Defaults to “celery”.
- **taskmeta_collection** The collection name to store task meta data. Defaults to “celery_taskmeta”.

Example configuration

```
CELERY_RESULT_BACKEND = "mongodb"
CELERY_MONGODB_BACKEND_SETTINGS = {
    "host": "192.168.1.100",
    "port": 30000,
    "database": "mydb",
    "taskmeta_collection": "my_taskmeta_collection",
}
```

3.2.9 Message Routing

**CELERY_QUEUES**

The mapping of queues the worker consumes from. This is a dictionary of queue name/options. See Routing Tasks for more information.

The default is a queue/exchange/binding key of “celery”, with exchange type `direct`.

You don’t have to care about this unless you want custom routing facilities.
CELEERY_ROUTES

A list of routers, or a single router used to route tasks to queues. When deciding the final destination of a task the routers are consulted in order. See Routers for more information.

CELEERY_CREATE_MISSING_QUEUES

If enabled (default), any queues specified that is not defined in CELERY_QUEUES will be automatically created. See Automatic routing.

CELEERY_DEFAULT_QUEUE

The queue used by default, if no custom queue is specified. This queue must be listed in CELERY_QUEUES. The default is: celery.

See also:

Changing the name of the default queue

CELEERY_DEFAULT_EXCHANGE

Name of the default exchange to use when no custom exchange is specified. The default is: celery.

CELEERY_DEFAULT_EXCHANGE_TYPE

Default exchange type used when no custom exchange is specified. The default is: direct.

CELEERY_DEFAULT_ROUTING_KEY

The default routing key used when sending tasks. The default is: celery.

CELEERY_DEFAULT_DELIVERY_MODE

Can be transient or persistent. The default is to send persistent messages.

3.2.10 Broker Settings

BROKER_BACKEND

The Kombu transport to use. Default is amqplib.

You can use a custom transport class name, or select one of the built-in transports: amqplib, pika, redis, beanstalk, sqlalchmy, django, mongodb, couchdb.

BROKER_HOST

Hostname of the broker.
**BROKER_PORT**

Custom port of the broker. Default is to use the default port for the selected backend.

**BROKER_USER**

Username to connect as.

**BROKER_PASSWORD**

Password to connect with.

**BROKER_VHOST**

Virtual host. Default is “/”.

**BROKER_USE_SSL**

Use SSL to connect to the broker. Off by default. This may not be supported by all transports.

**BROKER_CONNECTION_TIMEOUT**

The default timeout in seconds before we give up establishing a connection to the AMQP server. Default is 4 seconds.

**BROKER_CONNECTION_RETRY**

Automatically try to re-establish the connection to the AMQP broker if lost.

The time between retries is increased for each retry, and is not exhausted before `CELERY_BROKER_CONNECTION_MAX_RETRIES` is exceeded.

This behavior is on by default.

**CELERY_BROKER_CONNECTION_MAX_RETRIES**

Maximum number of retries before we give up re-establishing a connection to the AMQP broker.

If this is set to 0 or `None`, we will retry forever.

Default is 100 retries.

### 3.2.11 Task execution settings

**CELERY_ALWAYS_EAGER**

If this is `True`, all tasks will be executed locally by blocking until the task returns. `apply_async()` and `Task.delay()` will return an `EagerResult` instance, which emulates the API and behavior of `AsyncResult`, except the result is already evaluated.

That is, tasks will be executed locally instead of being sent to the queue.
CELERY_EAGER_PROPAGATES_EXCEPTIONS

If this is True, eagerly executed tasks (applied by task.apply(), or when the CELERY_ALWAYS_EAGER setting is enabled), will propagate exceptions.

It’s the same as always running apply() with throw=True.

CELERY_IGNORE_RESULT

Whether to store the task return values or not (tombstones). If you still want to store errors, just not successful return values, you can set CELERY_STORE_ERRORS_EVEN_IF_IGNORED.

CELERY_MESSAGE_COMPRESSION

Default compression used for task messages. Can be "gzip", "bzip2" (if available), or any custom compression schemes registered in the Kombu compression registry.

The default is to send uncompressed messages.

CELERY_TASK_RESULT_EXPIRES

Time (in seconds, or a timedelta object) for when after stored task tombstones will be deleted.

A built-in periodic task will delete the results after this time (celery.task.backend_cleanup).

Note: For the moment this only works with the database, cache, redis and MongoDB backends. For the AMQP backend see CELERY_AMQP_TASK_RESULT_EXPIRES.

When using the database or MongoDB backends, celerybeat must be running for the results to be expired.

CELERY_MAX_CACHED_RESULTS

Result backends caches ready results used by the client.

This is the total number of results to cache before older results are evicted. The default is 5000.

CELERY_TRACK_STARTED

If True the task will report its status as “started” when the task is executed by a worker. The default value is False as the normal behaviour is to not report that level of granularity. Tasks are either pending, finished, or waiting to be retried. Having a “started” state can be useful for when there are long running tasks and there is a need to report which task is currently running.

CELERY_TASK_SERIALIZER

A string identifying the default serialization method to use. Can be pickle (default), json, yaml, msgpack or any custom serialization methods that have been registered with kombu.serialization.registry.

See also:

Serializers.
**CELERY_TASK_PUBLISH_RETRY**

Decides if publishing task messages will be retried in the case of connection loss or other connection errors. See also **CELERY_TASK_PUBLISH_RETRY_POLICY**.

Disabled by default. Defines the default policy when retrying publishing a task message in the case of connection loss or other connection errors.

This is a mapping that must contain the following keys:

- **max_retries**
  
  Maximum number of retries before giving up, in this case the exception that caused the retry to fail will be raised.
  
  A value of 0 or `None` means it will retry forever.
  
  The default is to retry 3 times.

- **interval_start**
  
  Defines the number of seconds (float or integer) to wait between retries. Default is 0, which means the first retry will be instantaneous.

- **interval_step**
  
  On each consecutive retry this number will be added to the retry delay (float or integer). Default is 0.2.

- **interval_max**
  
  Maximum number of seconds (float or integer) to wait between retries. Default is 0.2.

With the default policy of:

```python
{"max_retries": 3,
 "interval_start": 0,
 "interval_step": 0.2,
 "interval_max": 0.2}
```

the maximum time spent retrying will be 0.4 seconds. It is set relatively short by default because a connection failure could lead to a retry pile effect if the broker connection is down: e.g. many web server processes waiting to retry blocking other incoming requests.

**CELERY_TASK_PUBLISH_RETRY_POLICY**

**CELERY_DEFAULT_RATE_LIMIT**

The global default rate limit for tasks.

This value is used for tasks that does not have a custom rate limit. The default is no rate limit.

**CELERY_DISABLE_RATE_LIMITS**

Disable all rate limits, even if tasks has explicit rate limits set.
**CELENY_ACKS_LATE**

Late ack means the task messages will be acknowledged after the task has been executed, not just before, which is the default behavior.

See also:

FAQ: Should I use retry or acks_late?

### 3.2.12 Worker: celeryd

**CELENY_IMPORTS**

A sequence of modules to import when the celery daemon starts.

This is used to specify the task modules to import, but also to import signal handlers and additional remote control commands, etc.

**CELENYD_MAX_TASKS_PER_CHILD**

Maximum number of tasks a pool worker process can execute before it’s replaced with a new one. Default is no limit.

**CELENYD_TASK_TIME_LIMIT**

Task hard time limit in seconds. The worker processing the task will be killed and replaced with a new one when this is exceeded.

**CELENYD_TASK_SOFT_TIME_LIMIT**

Task soft time limit in seconds.

The SoftTimeLimitExceeded exception will be raised when this is exceeded. The task can catch this to e.g. clean up before the hard time limit comes.

Example:

```python
from celery.task import task
from celery.exceptions import SoftTimeLimitExceeded

@task()
def mytask():
    try:
        return do_work()
    except SoftTimeLimitExceeded:
        cleanup_in_a_hurry()
```

**CELENY_STORE_ERRORS_EVEN_IF_IGNORED**

If set, the worker stores all task errors in the result store even if Task.ignore_result is on.
CELERYD_STATE_DB

Name of the file used to stores persistent worker state (like revoked tasks). Can be a relative or absolute path, but be aware that the suffix `.db` may be appended to the file name (depending on Python version).

Can also be set via the `--statedb` argument to `celeryd`.

Not enabled by default.

CELERYD_ETA_SCHEDULER_PRECISION

Set the maximum time in seconds that the ETA scheduler can sleep between rechecking the schedule. Default is 1 second.

Setting this value to 1 second means the schedulers precision will be 1 second. If you need near millisecond precision you can set this to 0.1.

3.2.13 Error E-Mails

CELERY_SEND_TASK_ERROR_EMAILS

The default value for the `Task.send_error_emails` attribute, which if set to `True` means errors occurring during task execution will be sent to `ADMINS` by e-mail.

CELERY_TASK_ERROR_WHITELIST

A white list of exceptions to send error e-mails for.

ADMINS

List of `(name, email_address)` tuples for the administrators that should receive error e-mails.

SERVER_EMAIL

The e-mail address this worker sends e-mails from. Default is `celery@localhost`.

MAIL_HOST

The mail server to use. Default is “localhost”.

MAIL_HOST_USER

User name (if required) to log on to the mail server with.

MAIL_HOST_PASSWORD

Password (if required) to log on to the mail server with.
MAIL_PORT

The port the mail server is listening on. Default is 25.

Example E-Mail configuration

This configuration enables the sending of error e-mails to george@vandelay.com and kramer@vandelay.com:

```python
# Enables error e-mails.
CELERY_SEND_TASK_ERROR_EMAILS = True

# Name and e-mail addresses of recipients
ADMINS = (
    ("George Costanza", "george@vandelay.com"),
    ("Cosmo Kramer", "kosmo@vandelay.com"),
)

# E-mail address used as sender (From field).
SERVER_EMAIL = "no-reply@vandelay.com"

# Mailserver configuration
EMAIL_HOST = "mail.vandelay.com"
EMAIL_PORT = 25
# EMAIL_HOST_USER = "servers"
# EMAIL_HOST_PASSWORD = "s3cr3t"
```

3.2.14 Events

CELERY_SEND_EVENTS

Send events so the worker can be monitored by tools like celerymon.

CELERY_SEND_TASK_SENT_EVENT

If enabled, a task-sent event will be sent for every task so tasks can be tracked before they are consumed by a worker. Disabled by default.

CELERY_EVENT_QUEUE

Name of the queue to consume event messages from. Default is “celeryevent”.

CELERY_EVENT_EXCHANGE

Name of the exchange to send event messages to. Default is “celeryevent”.

CELERY_EVENT_EXCHANGE_TYPE

The exchange type of the event exchange. Default is to use a “direct” exchange.
CELERY_EVENT_ROUTING_KEY
Routing key used when sending event messages. Default is “celeryevent”.

CELERY_EVENT_SERIALIZER
Message serialization format used when sending event messages. Default is “json”. See Serializers.

3.2.15 Broadcast Commands

CELERY_BROADCAST_QUEUE
Name prefix for the queue used when listening for broadcast messages. The workers host name will be appended to the prefix to create the final queue name.
Default is “celeryctl”.

CELERY_BROADCAST_EXCHANGE
Name of the exchange used for broadcast messages.
Default is “celeryctl”.

CELERY_BROADCAST_EXCHANGE_TYPE
Exchange type used for broadcast messages. Default is “fanout”.

3.2.16 Logging

CELERYD_HIJACK_ROOT_LOGGER
By default any previously configured logging options will be reset, because the Celery apps “hijacks” the root logger. If you want to customize your own logging then you can disable this behavior.

Note: Logging can also be customized by connecting to the celery.signals.setup_logging signal.

CELERYD_LOG_FILE
The default file name the worker daemon logs messages to. Can be overridden using the --logfile option to celeryd.
The default is None (stderr)

CELERYD_LOG_LEVEL
Worker log level, can be one of DEBUG, INFO, WARNING, ERROR or CRITICAL.
Can also be set via the --loglevel argument to celeryd.
See the logging module for more information.
**CELDERYD_LOG_COLOR**

Enables/disables colors in logging output by the Celery apps.

By default colors are enabled if

1. the app is logging to a real terminal, and not a file.
2. the app is not running on Windows.

**CELDERYD_LOG_FORMAT**

The format to use for log messages.

Default is `%(asctime)s: %(levelname)s/%(processName)s %message%

See the Python logging module for more information about log formats.

**CELDERYD_TASK_LOG_FORMAT**

The format to use for log messages logged in tasks. Can be overridden using the `--loglevel` option to `celeryd`.

Default is:

```
%(asctime)s: %(levelname)s/%(processName)s
    %(task_name)s(%(task_id)s): %(message)s
```

See the Python logging module for more information about log formats.

**CELDERY_REDIRECT_STDOUTS**

If enabled `stdout` and `stderr` will be redirected to the current logger.

Enabled by default. Used by `celeryd` and `celerybeat`.

**CELDERY_REDIRECT_STDOUTS_LEVEL**

The log level output to `stdout` and `stderr` is logged as. Can be one of `DEBUG`, `INFO`, `WARNING`, `ERROR` or `CRITICAL`.

Default is `WARNING`.

**3.2.17 Custom Component Classes (advanced)**

**CELDERYD_POOL**

Name of the pool class used by the worker.

You can use a custom pool class name, or select one of the built-in aliases: `processes`, `eventlet`, `gevent`.

Default is `processes`.

**CELDERYD_AUTOSCALER**

Name of the autoscaler class to use.

Default is `"celery.worker.autoscale.Autoscaler"`.
**CELERYD_CONSUMER**

Name of the consumer class used by the worker. Default is `celery.worker.consumer.Consumer`.

**CELERYD_MEDIATOR**

Name of the mediator class used by the worker. Default is `celery.worker.controllers.Mediator`.

**CELERYD_ETA_SCHEDULER**

Name of the ETA scheduler class used by the worker. Default is `celery.utils.timer2.Timer`, or one over-ridden by the pool implementation.

### 3.2.18 Periodic Task Server: celerybeat

**CELERYBEAT_SCHEDULE**

The periodic task schedule used by `celerybeat`. See Entries.

**CELERYBEAT_SCHEDULER**

The default scheduler class. Default is `“celery.beat.PersistentScheduler”`. Can also be set via the `-S` argument to `celerybeat`.

**CELERYBEAT_SCHEDULE_FILENAME**

Name of the file used by `PersistentScheduler` to store the last run times of periodic tasks. Can be a relative or absolute path, but be aware that the suffix `.db` may be appended to the file name (depending on Python version). Can also be set via the `--schedule` argument to `celerybeat`.

**CELERYBEAT_MAX_LOOP_INTERVAL**

The maximum number of seconds `celerybeat` can sleep between checking the schedule. Default is 300 seconds (5 minutes).

**CELERYBEAT_LOG_FILE**

The default file name to log messages to. Can be overridden using the `--logfile` option to `celerybeat`. The default is `None (stderr)`.

**CELERYBEAT_LOG_LEVEL**

Logging level. Can be any of `DEBUG`, `INFO`, `WARNING`, `ERROR`, or `CRITICAL`. Can also be set via the `--loglevel` argument to `celerybeat`. See the `logging` module for more information.
3.2.19 Monitor Server: celerymon

**CELERYMON_LOG_FILE**

The default file name to log messages to. Can be overridden using the *--logfile* argument to *celerymon*. The default is *None* (*stderr*)

**CELERYMON_LOG_LEVEL**

Logging level. Can be any of *DEBUG, INFO, WARNING, ERROR, or CRITICAL*. See the *logging* module for more information.
4.1 Creating Tasks

• Ensuring a task is only executed one at a time

4.1.1 Ensuring a task is only executed one at a time

You can accomplish this by using a lock.

In this example we’ll be using the cache framework to set a lock that is accessible for all workers.

It’s part of an imaginary RSS feed importer called djangofeeds. The task takes a feed URL as a single argument, and imports that feed into a Django model called Feed. We ensure that it’s not possible for two or more workers to import the same feed at the same time by setting a cache key consisting of the MD5 checksum of the feed URL.

The cache key expires after some time in case something unexpected happens (you never know, right?)

```python
from celery.task import Task
from django.core.cache import cache
from django.utils.hashcompat import md5_constructor as md5
from djangofeeds.models import Feed

LOCK_EXPIRE = 60 * 5  # Lock expires in 5 minutes

class FeedImporter(Task):
    name = "feed.import"

    def run(self, feed_url, **kwargs):
        logger = self.get_logger(**kwargs)

        # The cache key consists of the task name and the MD5 digest
        # of the feed URL.
        feed_url_digest = md5(feed_url).hexdigest()
        lock_id = "%s-lock-%s" % (self.name, feed_url_digest)

        # cache.add fails if the key already exists
        acquire_lock = lambda: cache.add(lock_id, "true", LOCK_EXPIRE)
        # memcache delete is very slow, but we have to use it to take
        # advantage of using add() for atomic locking
        release_lock = lambda: cache.delete(lock_id)
```
logger.debug("Importing feed: %s" % feed_url)
if acquire_lock():
    try:
        feed = Feed.objects.import_feed(feed_url)
    finally:
        release_lock()
return feed

logger.debug("Feed %s is already being imported by another worker" % (feed_url))
return

4.2 Running celeryd as a daemon

Celery does not daemonize itself, please use one of the following daemonization tools.

- Generic init scripts
  - Init script: celeryd
    * Example configuration
    * Example Django configuration
    * Available options
- start-stop-daemon (Debian/Ubuntu/++)
  - Init script: celeryd
    * Example configuration
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  - Init script: celerybeat
    * Example configuration
    * Example Django configuration
    * Available options
  - Troubleshooting
- supervisord
- launchd (OS X)

4.2.1 Generic init scripts

See the contrib/generic-init.d/ directory Celery distribution.

This directory contains generic bash init scripts for **celeryd**, that should run on Linux, FreeBSD, OpenBSD, and other Unix platforms.

**Init script: celeryd**

**Usage** /etc/init.d/celeryd {start|stop|restart|status}

**Configuration file** /etc/default/celeryd

To configure celeryd you probably need to at least tell it where to change directory to when it starts (to find your celeryconfig).
Example configuration

This is an example configuration for a Python project.

```
/etc/default/celeryd:

    # Name of nodes to start # here we have a single node CELERYD_NODES="w1" # or we could have
tree nodes: #CELERYD_NODES="w1 w2 w3"

    # Where to chdir at start. CELERYD_CHDIR="/opt/Myproject/

    # Extra arguments to celeryd CELERYD_OPTS="--time-limit=300 --concurrency=8"

    # Name of the celery config module. CELERY_CONFIG_MODULE="celeryconfig"

    # %n will be replaced with the nodename. CELERYD_LOG_FILE="/var/log/celery/%n.log" CELER

    # YD_P_ID_FILE="/var/run/celery/%n.pid"

    # Workers should run as an unprivileged user. CELERYD_USER="celery" CELER

    # YD_GROUP="celery"
```

Example Django configuration

This is an example configuration for those using `django-celery`:

```
# Name of nodes to start, here we have a single node
CE

   # or we could have three nodes:
   
   #CELERYD_NODES="w1 w2 w3"

   # Where to chdir at start. CELERYD_CHDIR="/opt/Myproject/

   # How to call "manage.py celeryd_multi"
   
   CELERYD_MULTI="$CELERYD_CHDIR/manage.py celeryd_multi"

   # Extra arguments to celeryd
   
   CELERYD_OPTS="--time-limit 300 --concurrency=8"

   # Name of the celery config module.
   
   CELERY_CONFIG_MODULE="celeryconfig"

   # %n will be replaced with the nodename.
   
   CELERYD_LOG_FILE="/var/log/celery/%n.log"
   CELERYD_PID_FILE="/var/run/celery/%n.pid"

   # Workers should run as an unprivileged user.
   
   CELERYD_USER="celery"
   CELERYD_GROUP="celery"

   # Name of the projects settings module.
   
   export DJANGO_SETTINGS_MODULE="settings"
```

Available options

- **CELERYD_NODES** Node names to start.
- **CELERYD_OPTS** Additional arguments to celeryd, see `celeryd --help` for a list.
• **CELERYD_CHDIR** Path to change directory to at start. Default is to stay in the current directory.

• **CELERYD_PID_FILE** Full path to the PID file. Default is `/var/run/celeryd%n.pid`

• **CELERYD_LOG_FILE** Full path to the celeryd log file. Default is `/var/log/celeryd@%n.log`

• **CELERYD_LOG_LEVEL** Log level to use for celeryd. Default is INFO.

• **CELERYD_MULTI** Path to the celeryd-multi program. Default is `celeryd-multi`. You can point this to an virtualenv, or even use `manage.py` for django.

• **CELERYD_USER** User to run celeryd as. Default is current user.

• **CELERYD_GROUP** Group to run celeryd as. Default is current user.

### 4.2.2 start-stop-daemon (Debian/Ubuntu/++)

See the `contrib/debian/init.d/` directory in the Celery distribution, this directory contains init scripts for celeryd and celerybeat.

These scripts are configured in `/etc/default/celeryd`.

**Init script: celeryd**

**Usage** /etc/init.d/celeryd {start|stop|force-reload|restart|try-restart|status}

**Configuration file** /etc/default/celeryd

To configure celeryd you probably need to at least tell it where to change directory to when it starts (to find your `celeryconfig`).

**Example configuration**

This is an example configuration for a Python project.

```
/etc/default/celeryd:
# Where to chdir at start. CELERYD_CHDIR="/opt/Myproject/
# Extra arguments to celeryd CELERYD_OPTS="–time-limit=300"
# Name of the celery config module. CELERY_CONFIG_MODULE="celeryconfig"
```

**Example Django configuration**

This is an example configuration for those using `django-celery`:

```
# Where the Django project is. CELERYD_CHDIR="/opt/Project/
# Path to celeryd CELERYD="/opt/Project/manage.py celeryd"
# Name of the projects settings module. export DJANGO_SETTINGS_MODULE="settings"
```
Available options

- **CELERYD_OPTS** Additional arguments to celeryd, see `celeryd --help` for a list.
- **CELERYD_CHDIR** Path to change directory to at start. Default is to stay in the current directory.
- **CELERYD_PID_FILE** Full path to the PID file. Default is `/var/run/celeryd.pid`.
- **CELERYD_LOG_FILE** Full path to the celeryd log file. Default is `/var/log/celeryd.log`.
- **CELERYD_LOG_LEVEL** Log level to use for celeryd. Default is INFO.
- **CELERYD** Path to the celeryd program. Default is `celeryd`. You can point this to an virtualenv, or even use `manage.py` for django.
- **CELERYD_USER** User to run celeryd as. Default is current user.
- **CELERYD_GROUP** Group to run celeryd as. Default is current user.

Init script: celerybeat

Usage: `/etc/init.d/celerybeat {start|stop|force-reload|restart|try-restart|status}`

Configuration file: `/etc/default/celerybeat` or `/etc/default/celeryd`

Example configuration

This is an example configuration for a Python project:

```
/etc/default/celeryd:

# Where to chdir at start.
CELERYD_CHDIR="/opt/Myproject/"

# Extra arguments to celeryd
CELERYD_OPTS="--time-limit=300"

# Extra arguments to celerybeat
CELERYBEAT_OPTS="--schedule=/var/run/celerybeat-schedule"

# Name of the celery config module.
CELERY_CONFIG_MODULE="celeryconfig"
```

Example Django configuration

This is an example configuration for those using `django-celery`:

```
# Where the Django project is.
CELERYD_CHDIR="/opt/Project/"

# Name of the projects settings module.
export DJANGO_SETTINGS_MODULE="settings"

# Path to celeryd
CELERYD="/opt/Project/manage.py celeryd"

# Path to celerybeat
CELERYBEAT="/opt/Project/manage.py celerybeat"
```
# Extra arguments to celerybeat
CELEBEAT_OPTS="$--schedule=/var/run/celerybeat-schedule"

Available options

- **CELEBEAT_OPTS** Additional arguments to celerybeat, see `celerybeat --help` for a list.
- **CELEBEAT_PIDFILE** Full path to the PID file. Default is /var/run/celeryd.pid.
- **CELEBEAT_LOGFILE** Full path to the celeryd log file. Default is /var/log/celeryd.log
- **CELEBEAT_LOG_LEVEL** Log level to use for celeryd. Default is INFO.
- **CELEBEAT** Path to the celeryd program. Default is `celeryd`. You can point this to an virtualenv, or even use manage.py for django.
- **CELEBEAT_USER** User to run celeryd as. Default is current user.
- **CELEBEAT_GROUP** Group to run celeryd as. Default is current user.

Troubleshooting

If you can’t get the init scripts to work, you should try running them in verbose mode:

```
$ sh -x /etc/init.d/celeryd start
```

This can reveal hints as to why the service won’t start.

Also you will see the commands generated, so you can try to run the celeryd command manually to read the resulting error output.

For example my `sh -x` output does this:

```
++ start-stop-daemon --start --chdir /opt/Opal/release/opal --quiet \ 
   --oknodo --background --make-pidfile --pidfile /var/run/celeryd.pid \ 
   --exec /opt/Opal/release/opal/manage.py celeryd -- --time-limit=300 \ 
   -f /var/log/celeryd.log -l INFO
```

Run the celeryd command after `--exec` (without the `--`) to show the actual resulting output:

```
$ /opt/Opal/release/opal/manage.py celeryd --time-limit=300 \ 
   -f /var/log/celeryd.log -l INFO
```

### 4.2.3 supervisord

- contrib/supervisord/

### 4.2.4 launchd (OS X)

- contrib/mac/

This page contains common recipes and techniques.
5.1 Community Code of Conduct

The goal is to maintain a diverse community that is pleasant for everyone. That is why we would greatly appreciate it if everyone contributing to and interacting with the community also followed this Code of Conduct.

The Code of Conduct covers our behavior as members of the community, in any forum, mailing list, wiki, website, Internet relay chat (IRC), public meeting or private correspondence.


5.1.1 Be considerate.

Your work will be used by other people, and you in turn will depend on the work of others. Any decision you take will affect users and colleagues, and we expect you to take those consequences into account when making decisions. Even if it’s not obvious at the time, our contributions to Ubuntu will impact the work of others. For example, changes to code, infrastructure, policy, documentation and translations during a release may negatively impact others work.

5.1.2 Be respectful.

The Celery community and its members treat one another with respect. Everyone can make a valuable contribution to Celery. We may not always agree, but disagreement is no excuse for poor behavior and poor manners. We might all experience some frustration now and then, but we cannot allow that frustration to turn into a personal attack. It’s important to remember that a community where people feel uncomfortable or threatened is not a productive one. We
expect members of the Celery community to be respectful when dealing with other contributors as well as with people outside the Celery project and with users of Celery.

5.1.3 Be collaborative.

Collaboration is central to Celery and to the larger free software community. We should always be open to collaboration. Your work should be done transparently and patches from Celery should be given back to the community when they are made, not just when the distribution releases. If you wish to work on new code for existing upstream projects, at least keep those projects informed of your ideas and progress. It may not be possible to get consensus from upstream, or even from your colleagues about the correct implementation for an idea, so don’t feel obliged to have that agreement before you begin, but at least keep the outside world informed of your work, and publish your work in a way that allows outsiders to test, discuss and contribute to your efforts.

5.1.4 When you disagree, consult others.

Disagreements, both political and technical, happen all the time and the Celery community is no exception. It is important that we resolve disagreements and differing views constructively and with the help of the community and community process. If you really want to go a different way, then we encourage you to make a derivative distribution or alternate set of packages that still build on the work we’ve done to utilize as common of a core as possible.

5.1.5 When you are unsure, ask for help.

Nobody knows everything, and nobody is expected to be perfect. Asking questions avoids many problems down the road, and so questions are encouraged. Those who are asked questions should be responsive and helpful. However, when asking a question, care must be taken to do so in an appropriate forum.

5.1.6 Step down considerately.

Developers on every project come and go and Celery is no different. When you leave or disengage from the project, in whole or in part, we ask that you do so in a way that minimizes disruption to the project. This means you should tell people you are leaving and take the proper steps to ensure that others can pick up where you leave off.

5.2 Reporting a Bug

Bugs can always be described to the Mailing list, but the best way to report an issue and to ensure a timely response is to use the issue tracker.

1. Create a GitHub account.

You need to create a GitHub account to be able to create new issues and participate in the discussion.

2. Determine if your bug is really a bug.

You should not file a bug if you are requesting support. For that you can use the Mailing list, or IRC.

3. Make sure your bug hasn’t already been reported.

Search through the appropriate Issue tracker. If a bug like yours was found, check if you have new information that could be reported to help the developers fix the bug.

4. Collect information about the bug.
To have the best chance of having a bug fixed, we need to be able to easily reproduce the conditions that caused it. Most of the time this information will be from a Python traceback message, though some bugs might be in design, spelling or other errors on the website/docs/code.

If the error is from a Python traceback, include it in the bug report.

We also need to know what platform you’re running (Windows, OSX, Linux, etc), the version of your Python interpreter, and the version of Celery, and related packages that you were running when the bug occurred.

5. Submit the bug.

By default GitHub will email you to let you know when new comments have been made on your bug. In the event you’ve turned this feature off, you should check back on occasion to ensure you don’t miss any questions a developer trying to fix the bug might ask.

5.2.1 Issue Trackers

Bugs for a package in the Celery ecosystem should be reported to the relevant issue tracker.

- Celery: http://github.com/ask/celery/issues/
- Django-Celery: http://github.com/ask/django-celery/issues
- Flask-Celery: http://github.com/ask/flask-celery/issues
- Celery-Pylons: http://bitbucket.org/ianschenck/celery-pylons/issues
- Kombu: http://github.com/ask/kombu/issues

If you are unsure of the origin of the bug you can ask the Mailing list, or just use the Celery issue tracker.

5.3 Coding Style

You should probably be able to pick up the coding style from surrounding code, but it is a good idea to be aware of the following conventions.

- All Python code must follow the PEP-8 guidelines.

pep8.py is an utility you can use to verify that your code is following the conventions.

- Docstrings must follow the PEP-257 conventions, and use the following style.

  Do this:

  ```python
  def method(self, arg):
      '''Short description.

      More details.
      '''
  ```

  or:

  ```python
  def method(self, arg):
      '''"Short description."'
  ```

  but not this:
```python
def method(self, arg):
    """
    Short description.
    """

    • Lines should not exceed 78 columns.
    • Import order
    – Python standard library (import xxx)
    – Python standard library (‘from xxx import’)
    – Third party packages.
    – Other modules from the current package.
    or in case of code using Django:
    – Python standard library (import xxx)
    – Python standard library (‘from xxx import’)
    – Third party packages.
    – Django packages.
    – Other modules from the current package.
    Within these sections imports should be sorted by name.
    Example:

    import threading
    import time

    from collections import deque
    from Queue import Queue, Empty

    from celery.datastructures import TokenBucket
    from celery.utils import timeutils
    from celery.utils.compat import all, izip_longest, chain_from_iterable

    • Wildcard imports must not be used (from xxx import *).
```
Community Resources

This is a list of external blog posts, tutorials and slides related to Celery. If you have a link that’s missing from this list, please contact the mailing-list or submit a patch.
Chapter 6. Community Resources

- Resources
  - Who’s using Celery
  - Wiki
  - Celery questions on Stack Overflow
  - Mailing-list Archive: celery-users
  - IRC Logs
- News
  - Celery: Mini Tutorial (Catalan)
  - Building a Django App Server with Chef
  - Introducció a Celery (Catalan)
  - Django and Celery - Death to Cron
  - Celery Tips
  - What’s your favorite Django app?
  - Virtualenv Tips
  - 10 Tools That Make Django Better
  - Distributed Task Locking in Celery
  - Celery — Python (Russian)
  - Celery (Russian)
  - Celery, RabbitMQ and sending messages directly.
  - Cron dentro do Django com Celery (Portuguese)
  - RabbitMQCeleryDjango (Japanese)
  - Kaninchen & Schlangen: RabbitMQ & Python (German)
  - Celery - Eine asynchrone Task Queue (nicht nur) für Django (German)
  - Asynchronous Processing Using Celery (historio.us)
  - “Massaging the Pony: Message Queues and You” (Djangocon 2010)
  - “Large problems, Mostly Solved” (Djangocon 2010)
  - A Simple Celery with Django How-To
  - Django and asynchronous jobs
  - Celery: Django (Russian)
  - Celery presentation at PyCon India 2010
  - celery, django and virtualenv playing nice.
  - Django Task Queueing with Celery
  - django-celery presentation at DJUGL 2010.
  - Django/Celery Quickstart (or, how I learned to stop using cron and love celery)
  - Using Python magic to improve the deferred API
  - How Celery, Carrot, and your messaging stack work
  - Large Problems in Django, Mostly Solved: Delayed Execution
  - Introduction to Celery
  - RabbitMQ, Celery and Django
  - Message Queues, Django and Celery Quick Start
  - Background task processing and deferred execution in Django
  - Build a processing queue [...] in less than a day using RabbitMQ and Celery
  - How to get celeryd to work on FreeBSD
  - Web-based 3D animation software
  - Queued Storage Backend for Django
  - RabbitMQ with Python and Ruby
6.1 Resources

6.1.1 Who’s using Celery
http://wiki.github.com/ask/celery/using

6.1.2 Wiki
http://wiki.github.com/ask/celery/

6.1.3 Celery questions on Stack Overflow
http://stackoverflow.com/search?q=celery&tab=newest

6.1.4 Mailing-list Archive: celery-users
http://blog.gmane.org/gmane.comp.python.amqp.celery.user

6.1.5 IRC Logs
http://botland.oebfare.com/logger/celery/

6.2 News

6.2.1 Celery: Mini Tutorial (Catalan)

6.2.2 Building a Django App Server with Chef

6.2.3 Introducció a Celery (Catalan)

6.2.4 Django and Celery - Death to Cron

6.2.5 Celery Tips
http://ericholscher.com/blog/2010/nov/2/celery-tips/
6.2.6 What’s your favorite Django app?
http://jacobian.org/writing/favorite-apps/

6.2.7 Virtualenv Tips
http://ericholscher.com/blog/2010/nov/1/virtualenv-tips/

6.2.8 10 Tools That Make Django Better
http://iamseb.com/seb/2010/10/10-django-tools/

6.2.9 Distributed Task Locking in Celery
http://www.loose-bits.com/2010_10_10_archive.html

6.2.10 Celery — Python (Russian)
http://www.bitbybit.ru/article/216

6.2.11 Celery (Russian)
http://vorushin.ru/blog/34-celery-described/

6.2.12 Celery, RabbitMQ and sending messages directly.

6.2.13 Cron dentro do Django com Celery (Portugese)

6.2.14 RabbitMQCeleryDjango (Japanese)
http://d.hatena.ne.jp/yuku_t/

6.2.15 Kaninchen & Schlangen: RabbitMQ & Python (German)
http://www.scribd.com/doc/37562923/Kaninchen-Schlangen-RabbitMQ-Python

6.2.16 Celery - Eine asynchrone Task Queue (nicht nur) für Django (German)
6.2.17 Asynchronous Processing Using Celery (historio.us)
http://blog.historio.us/asynchronous-processing-using-celery

6.2.18 “Massaging the Pony: Message Queues and You” (Djangocon 2010)
http://www.slideshare.net/shawnrider/massaging-the-pony-message-queues-and-you

6.2.19 “Large problems, Mostly Solved” (Djangocon 2010)
http://www.slideshare.net/ericholscher/large-problems

6.2.20 A Simple Celery with Django How-To

6.2.21 Django and asynchronous jobs

6.2.22 Celery: Django (Russian)

6.2.23 Celery presentation at PyCon India 2010

6.2.24 celery, django and virtualenv playing nice.

6.2.25 Django Task Queueing with Celery

6.2.26 django-celery presentation at DJUGL 2010.
http://www.slideshare.net/matclayton/django-celery

6.2.27 Django/Celery Quickstart (or, how I learned to stop using cron and love celery)
http://bitkickers.blogspot.com/2010/07/djangocelery-quickstart-or-how-i.html
6.2.28 Using Python magic to improve the deferred API

http://blog.notdot.net/2010/06/Using-Python-magic-to-improve-the-deferred-API

6.2.29 How Celery, Carrot, and your messaging stack work

http://jasonmbaker.com/how-celery-carrot-and-your-messaging-stack-wo

6.2.30 Large Problems in Django, Mostly Solved: Delayed Execution


6.2.31 Introduction to Celery

Awesome slides from when Idan Gazit had a talk about Celery at PyWeb-IL: http://www.slideshare.net/idangazit/an-introduction-to-celery

6.2.32 RabbitMQ, Celery and Django


6.2.33 Message Queues, Django and Celery Quick Start

Celery tutorial by Rich Leland, the installation section is Mac OS X specific: http://mathematism.com/2010/feb/16/message-queues-django-and-celery-quick-start/

6.2.34 Background task processing and deferred execution in Django

Alon Swartz writes about celery and RabbitMQ on his blog: http://www.turnkeylinux.org/blog/django-celery-rabbitmq

6.2.35 Build a processing queue [...] in less than a day using RabbitMQ and Celery


6.2.36 How to get celeryd to work on FreeBSD

Installing multiprocessing on FreeBSD isn’t that easy, but thanks to Viktor Petersson we now have a step-to-step guide: http://www.playingwithwire.com/2009/10/how-to-get-celeryd-to-work-on-freebsd/

6.2.37 Web-based 3D animation software

Indy Chang Liu at ThinkingCactus uses Celery to render animations asynchronously (PDF): http://ojs.pythonpapers.org/index.php/tppm/article/viewFile/105/122
6.2.38 Queued Storage Backend for Django

http://stepsandnumbers.com/archive/2010/01/04/queued-storage-backend-for-django/

6.2.39 RabbitMQ with Python and Ruby

7.1 Using Celery with Redis/Database as the messaging queue.

- Redis
  - Configuration
  - Results
- SQLAlchemy
  - Configuration
  - Results
- Django Database
  - Configuration

7.1.1 Redis

For the Redis support you have to install the Python redis client:

```bash
$ pip install -U redis
```

**Configuration**

Configuration is easy, set the transport, and configure the location of your Redis database:

```python
BROKER_BACKEND = "redis"
BROKER_HOST = "localhost"  # Maps to redis host.
BROKER_PORT = 6379          # Maps to redis port.
BROKER_VHOST = "0"          # Maps to database number.
```

**Results**

You probably also want to store results in Redis:
CELERY_RESULT_BACKEND = "redis"
REDIS_HOST = 6379
REDIS_PORT = 6379
REDIS_DB = 0

For a complete list of options supported by the Redis result backend see Redis backend settings.

If you don’t intend to consume results you should disable them:

CELERY_IGNORE_RESULT = True

### 7.1.2 SQLAlchemy

For the SQLAlchemy transport you have to install the kombu-sqlalchemy library:

$ pip install -U kombu-sqlalchemy

**Configuration**

This transport uses only the BROKER_BACKEND setting, which have to be an SQLAlchemy database URI.

1. Set your broker transport:

   BROKER_BACKEND = "sqlakombu.transport.Transport"

2. Configure the database URI:

   BROKER_HOST = "sqlite:///celerydb.sqlite"

Please see SQLAlchemy: Supported Databases for a table of supported databases. Some other SQLAlchemy Connection String examples:

# sqlite (filename)
BROKER_HOST = "sqlite:///celerydb.sqlite"

# mysql
BROKER_HOST = "mysql://scott:tiger@localhost/foo"

# postgresql
BROKER_HOST = "postgresql://scott:tiger@localhost/mydatabase"

# oracle
BROKER_HOST = "oracle://scott:tiger@127.0.0.1:1521/sidname"

**Results**

To store results in the database as well, you should configure the result backend. See Database backend settings.

If you don’t intend to consume results you should disable them:

CELERY_IGNORE_RESULT = True
7.1.3 Django Database

For the Django database transport support you have to install the *django-kombu* library:

```
$ pip install -U django-kombu
```

**Configuration**

The database backend uses the Django `DATABASE_*` settings for database configuration values.

1. Set your broker transport:
   
   ```
   BROKER_BACKEND = "djkombu.transport.DatabaseTransport"
   ```

2. Add *djkombu* to `INSTALLED_APPS`:
   
   ```
   INSTALLED_APPS = ("djkombu", )
   ```

3. Verify you database settings:
   
   ```
   DATABASE_ENGINE = "mysql"
   DATABASE_NAME = "mydb"
   DATABASE_USER = "myuser"
   DATABASE_PASSWORD = "secret"
   ```

   The above is just an example, if you haven’t configured your database before you should read the Django database settings reference: [http://docs.djangoproject.com/en/1.1/ref/settings/#database-engine](http://docs.djangoproject.com/en/1.1/ref/settings/#database-engine)

   1. Sync your database schema.
      
      ```
      $ python manage.py syncdb
      ```

7.2 Debugging Tasks Remotely (using pdb)

**7.2.1 Basics**

`celery.contrib.rdb` is an extended version of *pdb* that enables remote debugging of processes that does not have terminal access.

Example usage:

```
from celery.contrib import rdb
from celery.task import task

@task
def add(x, y):
    result = x + y
    rdb.set_trace()  # <- set breakpoint
    return result
```

`set_trace()` sets a breakpoint at the current location and creates a socket you can telnet into to remotely debug your task.

The debugger may be started by multiple processes at the same time, so rather than using a fixed port the debugger will search for an available port, starting from the base port (6900 by default). The base port can be changed using the environment variable `CELERY_RDB_PORT`. 
By default the debugger will only be available from the local host, to enable access from the outside you have to set the environment variable `CELERY_RDB_HOST`.

When `celeryd` encounters your breakpoint it will log the following information:

```
[INFO/MainProcess] Got task from broker:
tasks.add[d7261c71-4962-47e5-b342-2448bedd20e8]
[WARNING/PoolWorker-1] Remote Debugger:6900:
    Please telnet 127.0.0.1 6900. Type 'exit' in session to continue.
    Waiting for client...
```

If you telnet the port specified you will be presented with a `pdb` shell:

```
$ telnet localhost 6900
Connected to localhost.
Escape character is ‘^]’.
> /opt/devel/demoapp/tasks.py(128)add()
--> return result
(Pdb)
```

Enter `help` to get a list of available commands, It may be a good idea to read the Python Debugger Manual if you have never used `pdb` before.

To demonstrate, we will read the value of the `result` variable, change it and continue execution of the task:

```
(Pdb) result
4
(Pdb) result = "hello from rdb"
(Pdb) continue
```

The result of our vandalism can be seen in the worker logs:

```
tasks.add[d7261c71-4962-47e5-b342-2448bedd20e8] succeeded
in 61.481s: 'hello from rdb'
```

### 7.2.2 Tips

#### Enabling the breakpoint signal

If the environment variable `CELERY_RDBSIG` is set, the worker will open up an rdb instance whenever the `SIGUSR2` signal is sent. This is the case for both main and worker processes.

For example starting the worker with:

```
CELERY_RDBSIG=1 celeryd -l info
```

You can start an rdb session for any of the worker processes by executing:

```
kill -USR2 <pid>
```

### 7.3 Tutorial: Creating a click counter using Kombu and celery
7.3.1 Introduction

A click counter should be easy, right? Just a simple view that increments a click in the DB and forwards you to the real destination.

This would work well for most sites, but when traffic starts to increase, you are likely to bump into problems. One database write for every click is not good if you have millions of clicks a day.

So what can you do? In this tutorial we will send the individual clicks as messages using kombu, and then process them later with a Celery periodic task.

Celery and Kombu are excellent in tandem, and while this might not be the perfect example, you’ll at least see one example how of they can be used to solve a task.

7.3.2 The model

The model is simple. Click has the URL as primary key and a number of clicks for that URL. Its manager, ClickManager implements the increment_clicks method, which takes a URL and by how much to increment its count by.

```python
from django.db import models
from django.utils.translation import ugettext_lazy as _

class ClickManager(models.Manager):
    
    def increment_clicks(self, for_url, increment_by=1):
        """Increment the click count for an URL."

        >>> Click.objects.increment_clicks("http://google.com", 10)

        
        click, created = self.get_or_create(url=for_url,
                        defaults={"click_count": increment_by})
        if not created:
            click.click_count += increment_by
            click.save()

        return click.click_count

class Click(models.Model):
    url = models.URLField(_, u"URL"), verify_exists=False, unique=True)
    click_count = models.PositiveIntegerField(_, u"click_count"),
                         default=0)
```

7.3. Tutorial: Creating a click counter using Kombu and celery
objects = ClickManager()

class Meta:
    verbose_name = _(u"URL clicks")
    verbose_name_plural = _(u"URL clicks")

7.3.3 Using Kombu to send clicks as messages

The model is normal django stuff, nothing new there. But now we get on to the messaging. It has been a tradition for me to put the projects messaging related code in its own `messaging.py` module, and I will continue to do so here so maybe you can adopt this practice. In this module we have two functions:

• **send_increment_clicks**
  
  This function sends a simple message to the broker. The message body only contains the URL we want to increment as plain-text, so the exchange and routing key play a role here. We use an exchange called `clicks`, with a routing key of `increment_click`, so any consumer binding a queue to this exchange using this routing key will receive these messages.

• **process_clicks**
  
  This function processes all currently gathered clicks sent using `send_increment_clicks`. Instead of issuing one database query for every click it processes all of the messages first, calculates the new click count and issues one update per URL. A message that has been received will not be deleted from the broker until it has been acknowledged by the receiver, so if the receiver dies in the middle of processing the message, it will be re-sent at a later point in time. This guarantees delivery and we respect this feature here by not acknowledging the message until the clicks has actually been written to disk.

  **Note:** This could probably be optimized further with some hand-written SQL, but it will do for now. Let’s say it’s an exercise left for the picky reader, albeit a discouraged one if you can survive without doing it.

On to the code...

```python
from celery.messaging import establish_connection
from kombu.compat import Publisher, Consumer
from clickmuncher.models import Click

def send_increment_clicks(for_url):
    """Send a message for incrementing the click count for an URL."""
    connection = establish_connection()
    publisher = Publisher(connection=connection,
                           exchange="clicks",
                           routing_key="increment_click",
                           exchange_type="direct")

    publisher.send(for_url)

    publisher.close()
    connection.close()

def process_clicks():
    """Process all currently gathered clicks by saving them to the database."""
```

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connection = establish_connection()
consumer = Consumer(connection=connection,
    queue="clicks",
    exchange="clicks",
    routing_key="increment_click",
    exchange_type="direct")

# First process the messages: save the number of clicks
# for every URL.
clicks_for_url = {}
messages_for_url = {}
for message in consumer.iterqueue():
    url = message.body
    clicks_for_url[url] = clicks_for_url.get(url, 0) + 1
    # We also need to keep the message objects so we can ack the
    # messages as processed when we are finished with them.
    if url in messages_for_url:
        messages_for_url[url].append(message)
    else:
        messages_for_url[url] = [message]

# Then increment the clicks in the database so we only need
# one UPDATE/INSERT for each URL.
for url, click_count in clicks_for_urls.items():
    Click.objects.increment_clicks(url, click_count)
    # Now that the clicks has been registered for this URL we can
    # acknowledge the messages
    [message.ack() for message in messages_for_url[url]]

consumer.close()
connection.close()

7.3.4 View and URLs

This is also simple stuff, don’t think I have to explain this code to you. The interface is as follows, if you have a link
to http://google.com you would want to count the clicks for, you replace the URL with:


and the count view will send off an increment message and forward you to that site.

clickmuncher/views.py:

from django.http import HttpResponseRedirect
from clickmuncher.messaging import send_increment_clicks

def count(request):
    url = request.GET["u"]
    send_increment_clicks(url)
    return HttpResponseRedirect(url)

clickmuncher/urls.py:

from django.conf.urls.defaults import patterns, url
from clickmuncher import views

urlpatterns = patterns("",
    url(r'^count/?$','count', name='count'),
)
url(r'^$', views.count, name="clickmuncher-count"),
}

### 7.3.5 Creating the periodic task

Processing the clicks every 30 minutes is easy using celery periodic tasks.

```
clickmuncher/tasks.py:
from celery.task import PeriodicTask
from clickmuncher.messaging import process_clicks
from datetime import timedelta

class ProcessClicksTask(PeriodicTask):
    run_every = timedelta(minutes=30)

    def run(self, **kwargs):
        process_clicks()
```

We subclass from `celery.task.base.PeriodicTask`, set the `run_every` attribute and in the body of the task just call the `process_clicks` function we wrote earlier.

### 7.3.6 Finishing

There are still ways to improve this application. The URLs could be cleaned so the URL http://google.com and http://google.com/ is the same. Maybe it’s even possible to update the click count using a single UPDATE query?

If you have any questions regarding this tutorial, please send a mail to the mailing-list or come join us in the #celery IRC channel at Freenode: http://celeryq.org/introduction.html#getting-help
CHAPTER 8

Frequently Asked Questions
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• Windows
  – celeryd keeps spawning processes at startup
  – The -B / --beat option to celeryd doesn’t work?
  – django-celery can’t find settings?
8.1 General

8.1.1 What kinds of things should I use Celery for?

**Answer:** *Queue everything and delight everyone* is a good article describing why you would use a queue in a web context.

These are some common use cases:

- Running something in the background. For example, to finish the web request as soon as possible, then update the users page incrementally. This gives the user the impression of good performance and “snappiness”, even though the real work might actually take some time.
- Running something after the web request has finished.
- Making sure something is done, by executing it asynchronously and using retries.
- Scheduling periodic work.

And to some degree:

- Distributed computing.
- Parallel execution.

8.2 Misconceptions

8.2.1 Is Celery dependent on pickle?

**Answer:** No.

Celery can support any serialization scheme and has support for JSON/YAML and Pickle by default. And as every task is associated with a content type, you can even send one task using pickle, and another using JSON.

The default serialization format is pickle simply because it is convenient as it supports sending complex Python objects as task arguments.

If you need to communicate with other languages you should change to a serialization format that is suitable for that.

You can set a global default serializer, the default serializer for a particular Task, or even what serializer to use when sending a single task instance.

8.2.2 Is Celery for Django only?

**Answer:** No.

Celery does not depend on Django anymore. To use Celery with Django you have to use the *django-celery* package.

8.2.3 Do I have to use AMQP/RabbitMQ?

**Answer:** No.

You can also use Redis, Beanstalk, CouchDB, MongoDB or an SQL database, see *Using other queues*.

These “virtual transports” may have limited broadcast and event functionality. For example remote control commands only works with AMQP and Redis.
Redis or a database won’t perform as well as an AMQP broker. If you have strict reliability requirements you are encouraged to use RabbitMQ or another AMQP broker. Redis/database also use polling, so they are likely to consume more resources. However, if you for some reason are not able to use AMQP, feel free to use these alternatives. They will probably work fine for most use cases, and note that the above points are not specific to Celery: If using Redis/database as a queue worked fine for you before, it probably will now. You can always upgrade later if you need to.

8.2.4 Is Celery multilingual?

**Answer:** Yes.

**celeryd** is an implementation of Celery in python. If the language has an AMQP client, there shouldn’t be much work to create a worker in your language. A Celery worker is just a program connecting to the broker to process messages.

Also, there’s another way to be language independent, and that is to use REST tasks, instead of your tasks being functions, they’re URLs. With this information you can even create simple web servers that enable preloading of code. See: User Guide: Remote Tasks.

8.3 Troubleshooting

8.3.1 MySQL is throwing deadlock errors, what can I do?

**Answer:** MySQL has default isolation level set to **REPEATABLE-READ**, if you don’t really need that, set it to **READ-COMMITTED**. You can do that by adding the following to your *my.cnf*:

```
[mysqld]
transaction-isolation = READ-COMMITTED
```

For more information about InnoDB’s transaction model see MySQL - The InnoDB Transaction Model and Locking in the MySQL user manual.

(Thanks to Honza Kral and Anton Tsigularov for this solution)

8.3.2 celeryd is not doing anything, just hanging

**Answer:** See MySQL is throwing deadlock errors, what can I do?. or Why is Task.delay/apply* just hanging?.

8.3.3 Why is Task.delay/apply*/celeryd just hanging?

**Answer:** There is a bug in some AMQP clients that will make it hang if it’s not able to authenticate the current user, the password doesn’t match or the user does not have access to the virtual host specified. Be sure to check your broker logs (for RabbitMQ that is `/var/log/rabbitmq/rabbit.log` on most systems), it usually contains a message describing the reason.

8.3.4 Why won’t celeryd run on FreeBSD?

**Answer:** The multiprocessing pool requires a working POSIX semaphore implementation which isn’t enabled in FreeBSD by default. You have to enable POSIX semaphores in the kernel and manually recompile multiprocessing.

Luckily, Viktor Petersson has written a tutorial to get you started with Celery on FreeBSD here: http://www.playingwithwire.com/2009/10/how-to-get-celeryd-to-work-on-freebsd/
8.3.5 I’m having *IntegrityError: Duplicate Key errors. Why?*

**Answer:** See [MySQL is throwing deadlock errors, what can I do?](#). Thanks to howsthetdotcom.

8.3.6 Why aren’t my tasks processed?

**Answer:** With RabbitMQ you can see how many consumers are currently receiving tasks by running the following command:

```
$ rabbitmqctl list_queues -p <myvhost> name messages consumers
Listing queues ...
celery 2891 2
```

This shows that there’s 2891 messages waiting to be processed in the task queue, and there are two consumers processing them.

One reason that the queue is never emptied could be that you have a stale worker process taking the messages hostage. This could happen if celeryd wasn’t properly shut down.

When a message is received by a worker the broker waits for it to be acknowledged before marking the message as processed. The broker will not re-send that message to another consumer until the consumer is shut down properly.

If you hit this problem you have to kill all workers manually and restart them:

```
ps auxww | grep celeryd | awk '{print $2}' | xargs kill
```

You might have to wait a while until all workers have finished the work they’re doing. If it’s still hanging after a long time you can kill them by force with:

```
ps auxww | grep celeryd | awk '{print $2}' | xargs kill -9
```

8.3.7 Why won’t my Task run?

**Answer:** There might be syntax errors preventing the tasks module being imported.

You can find out if Celery is able to run the task by executing the task manually:

```python
>>> from myapp.tasks import MyPeriodicTask
>>> MyPeriodicTask.delay()
```

Watch celeryd’s log file to see if it’s able to find the task, or if some other error is happening.

8.3.8 Why won’t my Periodic Task run?

**Answer:** See Why won’t my Task run?.

8.3.9 How do I discard all waiting tasks?

**Answer:** You can use celeryctl to purge all configured task queues:

```
$ celeryctl purge
```

or programatically:
>>> from celery.task.control import discard_all
>>> discard_all()
1753

If you only want to purge messages from a specific queue you have to use the AMQP API or the `camqadm` utility:

```
$ camqadm queue.purge <queue name>
```

The number 1753 is the number of messages deleted.

You can also start celeryd with the `--purge` argument, to purge messages when the worker starts.

### 8.3.10 I've discarded messages, but there are still messages left in the queue?

**Answer:** Tasks are acknowledged (removed from the queue) as soon as they are actually executed. After the worker has received a task, it will take some time until it is actually executed, especially if there are a lot of tasks already waiting for execution. Messages that are not acknowledged are held on to by the worker until it closes the connection to the broker (AMQP server). When that connection is closed (e.g. because the worker was stopped) the tasks will be re-sent by the broker to the next available worker (or the same worker when it has been restarted), so to properly purge the queue of waiting tasks you have to stop all the workers, and then discard the tasks using `discard_all()`.

### 8.4 Results

#### 8.4.1 How do I get the result of a task if I have the ID that points there?

**Answer:** Use `Task.AsyncResult`:

```python
>>> result = MyTask.AsyncResult(task_id)
>>> result.get()
```

This will give you a `BaseAsyncResult` instance using the tasks current result backend.

If you need to specify a custom result backend you should use `celery.result.BaseAsyncResult` directly:

```python
>>> from celery.result import BaseAsyncResult
>>> result = BaseAsyncResult(task_id, backend=...)
>>> result.get()
```

### 8.5 Security

#### 8.5.1 Isn’t using `pickle` a security concern?

**Answer:** Yes, indeed it is.

You are right to have a security concern, as this can indeed be a real issue. It is essential that you protect against unauthorized access to your broker, databases and other services transmitting pickled data.

For the task messages you can set the `CELERY_TASK_SERIALIZER` setting to “json” or “yaml” instead of pickle. There is currently no alternative solution for task results (but writing a custom result backend using JSON is a simple task)

Note that this is not just something you should be aware of with Celery, for example also Django uses pickle for its cache client.
8.5.2 Can messages be encrypted?

**Answer:** Some AMQP brokers supports using SSL (including RabbitMQ). You can enable this using the `BROKER_USE_SSL` setting.

It is also possible to add additional encryption and security to messages, if you have a need for this then you should contact the *Mailing list*.

8.5.3 Is it safe to run celeryd as root?

**Answer:** No!

We’re not currently aware of any security issues, but it would be incredibly naive to assume that they don’t exist, so running the Celery services (*celeryd*, *celerybeat*, *celeryev*, etc) as an unprivileged user is recommended.

8.6 Brokers

8.6.1 Why is RabbitMQ crashing?

**Answer:** RabbitMQ will crash if it runs out of memory. This will be fixed in a future release of RabbitMQ. Please refer to the RabbitMQ FAQ: [http://www.rabbitmq.com/faq.html#node-runs-out-of-memory](http://www.rabbitmq.com/faq.html#node-runs-out-of-memory)

**Note:** This is no longer the case. RabbitMQ versions 2.0 and above includes a new persister, that is tolerant to out of memory errors. RabbitMQ 2.1 or higher is recommended for Celery.

If you're still running an older version of RabbitMQ and experience crashes, then please upgrade!

Misconfiguration of Celery can eventually lead to a crash on older version of RabbitMQ. Even if it doesn’t crash, this can still consume a lot of resources, so it is very important that you are aware of the common pitfalls.

- Events.
  
  Running *celeryd* with the `-E|--events` option will send messages for events happening inside of the worker.
  
  Events should only be enabled if you have an active monitor consuming them, or if you purge the event queue periodically.
  
  - AMQP backend results.
    
    When running with the AMQP result backend, every task result will be sent as a message. If you don’t collect these results, they will build up and RabbitMQ will eventually run out of memory.
    
    If you don’t use the results for a task, make sure you set the `ignore_result` option:
    
    Results can also be disabled globally using the `CELERY_IGNORE_RESULT` setting.

**Note:** Celery version 2.1 added support for automatic expiration of AMQP result backend results. To use this you need to run RabbitMQ 2.1 or higher and enable the `CELERY_AMQP_TASK_RESULT_EXPIRES` setting.

8.6.2 Can I use Celery with ActiveMQ/STOMP?

**Answer:** No. It used to be supported by Carrot, but is not currently supported in Kombu.
8.6.3 What features are not supported when not using an AMQP broker?

This is an incomplete list of features not available when using the virtual transports:

- Remote control commands (supported only by Redis).
- Monitoring with events may not work in all virtual transports.
- The header and fanout exchange types (fanout is supported by Redis).

8.7 Tasks

8.7.1 How can I reuse the same connection when applying tasks?

**Answer**: See *Connections and connection timeouts*.

8.7.2 Can I execute a task by name?

**Answer**: Yes. Use `celery.execute.send_task()`. You can also execute a task by name from any language that has an AMQP client.

```python
>>> from celery.execute import send_task
>>> send_task("tasks.add", args=[2, 2], kwargs={})
<AsyncResult: 373550e8-b9a0-4666-bc61-ace01fa4f91d>
```

8.7.3 How can I get the task id of the current task?

**Answer**: The current id and more is available in the task request:

```python
@task
def mytask():
    cache.set(mytask.request.id, "Running")
```

For more information see *Context*.

8.7.4 Can I specify a custom task_id?

**Answer**: Yes. Use the `task_id` argument to `apply_async()`:

```python
>>> task.apply_async(args, kwargs, task_id="...")
```

8.7.5 Can I use decorators with tasks?

**Answer**: Yes. But please see note at *Decorating tasks*.

8.7.6 Can I use natural task ids?

**Answer**: Yes, but make sure it is unique, as the behavior for two tasks existing with the same id is undefined.

The world will probably not explode, but at the worst they can overwrite each others results.
8.7.7 How can I run a task once another task has finished?

**Answer:** You can safely launch a task inside a task. Also, a common pattern is to use callback tasks:

```python
@task()
def add(x, y, callback=None):
    result = x + y
    if callback:
        subtask(callback).delay(result)
    return result
```

```python
@task(ignores_result=True)
def log_result(result, **kwargs):
    logger = log_result.get_logger(**kwargs)
    logger.info("log_result got: \$s\" % (result, ))
```

Invocation:

```python
>>> add.delay(2, 2, callback=log_result.subtask())
```

See *Sets of tasks, Subtasks and Callbacks* for more information.

8.7.8 Can I cancel the execution of a task?

**Answer:** Yes. Use `result.revoke`:

```python
>>> result = add.apply_async(args=[2, 2], countdown=120)
>>> result.revoke()
```

or if you only have the task id:

```python
>>> from celery.task.control import revoke
>>> revoke(task_id)
```

8.7.9 Why aren’t my remote control commands received by all workers?

**Answer:** To receive broadcast remote control commands, every worker node uses its host name to create a unique queue name to listen to, so if you have more than one worker with the same host name, the control commands will be received in round-robin between them.

To work around this you can explicitly set the host name for every worker using the `--hostname` argument to `celeryd`:

```bash
$ celeryd --hostname=$(hostname).1
$ celeryd --hostname=$(hostname).2
```

etc., etc...

8.7.10 Can I send some tasks to only some servers?

**Answer:** Yes. You can route tasks to an arbitrary server using AMQP, and a worker can bind to as many queues as it wants.

See *Routing Tasks* for more information.
8.7.11 Can I change the interval of a periodic task at runtime?

**Answer:** Yes. You can use the Django database scheduler, or you can override `PeriodicTask.is_due` or turn `PeriodicTask.run_every` into a property:

```python
class MyPeriodic(PeriodicTask):
    def run(self):
        # ...

    @property
    def run_every(self):
        return get_interval_from_database(...)
```

8.7.12 Does celery support task priorities?

**Answer:** No. In theory, yes, as AMQP supports priorities. However RabbitMQ doesn’t implement them yet.

The usual way to prioritize work in Celery, is to route high priority tasks to different servers. In the real world this may actually work better than per message priorities. You can use this in combination with rate limiting to achieve a highly responsive system.

8.7.13 Should I use retry or acks_late?

**Answer:** Depends. It’s not necessarily one or the other, you may want to use both.

`Task.retry` is used to retry tasks, notably for expected errors that is catchable with the `try:` block. The AMQP transaction is not used for these errors: **if the task raises an exception it is still acknowledged**!

The `acks_late` setting would be used when you need the task to be executed again if the worker (for some reason) crashes mid-execution. It’s important to note that the worker is not known to crash, and if it does it is usually an unrecoverable error that requires human intervention (bug in the worker, or task code).

In an ideal world you could safely retry any task that has failed, but this is rarely the case. Imagine the following task:

```python
@task()
def process_upload(filename, tmpfile):
    # Increment a file count stored in a database
    increment_file_counter()
    add_file_metadata_to_db(filename, tmpfile)
    copy_file_to_destination(filename, tmpfile)
```

If this crashed in the middle of copying the file to its destination the world would contain incomplete state. This is not a critical scenario of course, but you can probably imagine something far more sinister. So for ease of programming we have less reliability; It’s a good default, users who require it and know what they are doing can still enable `acks_late` (and in the future hopefully use manual acknowledgement)

In addition `Task.retry` has features not available in AMQP transactions: delay between retries, max retries, etc.

So use retry for Python errors, and if your task is idempotent combine that with `acks_late` if that level of reliability is required.

8.7.14 Can I schedule tasks to execute at a specific time?

**Answer:** Yes. You can use the `eta` argument of `Task.apply_async()`.

Or to schedule a periodic task at a specific time, use the `celery.schedules.crontab` schedule behavior:
from celery.task.schedules import crontab
from celery.task import periodic_task

@periodic_task(run_every=crontab(hours=7, minute=30, day_of_week="mon"))
def every_monday_morning():
    print("This is run every Monday morning at 7:30")

8.7.15 How do I shut down celeryd safely?

Answer: Use the TERM signal, and the worker will finish all currently executing jobs and shut down as soon as possible. No tasks should be lost.

You should never stop celeryd with the KILL signal (-9), unless you’ve tried TERM a few times and waited a few minutes to let it get a chance to shut down. As if you do tasks may be terminated mid-execution, and they will not be re-run unless you have the acks_late option set (Task.acks_late / CELERY_ACKS_LATE).

See also:

Stopping the worker

8.7.16 How do I run celeryd in the background on [platform]?

Answer: Please see Running celeryd as a daemon.

8.8 Windows

8.8.1 celeryd keeps spawning processes at startup

Answer: This is a known issue on Windows. You have to start celeryd with the command:

$ python -m celeryd.bin.celeryd

Any additional arguments can be appended to this command.


8.8.2 The -B / --beat option to celeryd doesn’t work?

Answer: That’s right. Run celerybeat and celeryd as separate services instead.

8.8.3 django-celery can’t find settings?

Answer: You need to specify the --settings argument to manage.py:

$ python manage.py celeryd start --settings=settings

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• 2.0.1
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  – Foreword
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    • Database result backend
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  – News
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• 1.0.4
• 1.0.3
  – Important notes
9.1 2.2.10

**release-date**  2012-02-07 04:40 P.M GMT

- Fixes infinite loop in `safe_str` (Issue #481).

9.2 2.2.9

**release-date**  2011-12-13 11:00 A.M GMT

- The group id was not changed if both `--uid` and `--gid` specified.

9.3 2.2.8

**release-date**  2011-11-25 16:00 P.M GMT

**by**  Ask Solem

9.3.1 Security Fixes

- [Security: CELERYSA-0001] Daemons would set effective id’s rather than real id’s when the `--uid/--gid` arguments to `celeryd-multi, celeryd_detach, celerybeat` and `celeryev` were used.

This means privileges weren’t properly dropped, and that it would be possible to regain supervisor privileges later.

9.4 2.2.7

**release-date**  2011-06-13 16:00 P.M BST

- New signals: `after_setup_logger` and `after_setup_task_logger`

These signals can be used to augment logging configuration after Celery has set up logging.

- Redis result backend now works with Redis 2.4.4.
- `celeryd_multi`: The `--gid` option now works correctly.
- `celeryd`: Retry wrongfully used the repr of the traceback instead of the string representation.
- `App.config_from_object`: Now loads module, not attribute of module.
- Fixed issue where logging of objects would give “<Unrepresentable: ...>”

9.5 2.2.6

**release-date**  2011-04-15 16:00 P.M CEST
9.5.1 Important Notes

- Now depends on Kombu 1.1.2.
- Dependency lists now explicitly specifies that we don’t want python-dateutil 2.x, as this version only supports py3k.

  If you have installed dateutil 2.0 by accident you should downgrade to the 1.5.0 version:

  ```bash
  pip install -U python-dateutil==1.5.0
  ```

  or by easy_install:

  ```bash
  easy_install -U python-dateutil==1.5.0
  ```

9.5.2 Fixes

- The new `WatchedFileHandler` broke Python 2.5 support (Issue #367).
- Task: Don’t use `app.main` if the task name is set explicitly.
- Sending emails did not work on Python 2.5, due to a bug in the version detection code (Issue #378).
- Beat: Adds method `ScheduleEntry._default_now`.

  This method can be overridden to change the default value of `last_run_at`.

- An error occurring in process cleanup could mask task errors.

  We no longer propagate errors happening at process cleanup, but log them instead. This way they will not interfere with publishing the task result (Issue #365).

- Defining tasks did not work properly when using the Django `shell_plus` utility (Issue #366).
- `AsyncResult.get` did not accept the `interval` and `propagate` arguments.
- `celeryd`: Fixed a bug where `celeryd` would not shutdown if a `socket.error` was raised.

9.6 2.2.5

**release-date** 2011-03-28 06:00 P.M CEST

9.6.1 Important Notes

- Now depends on Kombu 1.0.7

9.6.2 News

- Our documentation is now hosted by Read The Docs (http://docs.celeryproject.org), and all links have been changed to point to the new URL.
- Logging: Now supports log rotation using external tools like `logrotate.d` (Issue #321)

  This is accomplished by using the `WatchedFileHandler`, which re-opens the file if it is renamed or deleted.
• Using Celery with Redis/Database as the messaging queue. now documents how to configure Redis/Database result backends.

• gevent: Now supports ETA tasks.
  
  But gevent still needs CELERY_DISABLE_RATE_LIMITS=True to work.

• TaskSet User Guide: now contains TaskSet callback recipes.

• Eventlet: New signals:
  
  - eventlet_pool_started
  - eventlet_pool_preshutdown
  - eventlet_pool_postshutdown
  - eventlet_pool_apply

  See signals for more information.

• New BROKER_TRANSPORT_OPTIONS setting can be used to pass additional arguments to a particular broker transport.

• celeryd: worker_pids is now part of the request info as returned by broadcast commands.

• TaskSet.apply/Taskset.apply_async now accepts an optional taskset_id argument.

• The taskset_id (if any) is now available in the Task request context.

• SQLAlchemy result backend: taskset_id and taskset_id columns now have a unique constraint. (Tables need to recreated for this to take affect).

• Task Userguide: Added section about choosing a result backend.

• Removed unused attributeAsyncResult.uuid.

9.6.3 Fixes

• multiprocessing.Pool: Fixes race condition when marking job with WorkerLostError (Issue #268).

  The process may have published a result before it was terminated, but we have no reliable way to detect that this is the case.

  So we have to wait for 10 seconds before marking the result with WorkerLostError. This gives the result handler a chance to retrieve the result.

• multiprocessing.Pool: Shutdown could hang if rate limits disabled.

  There was a race condition when the MainThread was waiting for the pool semaphore to be released. The ResultHandler now terminates after 5 seconds if there are unacked jobs, but no worker processes left to start them (it needs to timeout because there could still be an ack+result that we haven’t consumed from the result queue. It is unlikely we will receive any after 5 seconds with no worker processes).

• celerybeat: Now creates pidfile even if the --detach option is not set.

• eventlet/gevent: The broadcast command consumer is now running in a separate greenthread.

  This ensures broadcast commands will take priority even if there are many active tasks.

• Internal module celery.worker.controllers renamed to celery.worker.mediator.

• celeryd: Threads now terminates the program by calling os._exit, as it is the only way to ensure exit in the case of syntax errors, or other unrecoverable errors.
• Fixed typo in `maybe_timedelta` (Issue #352).
• celeryd: Broadcast commands now logs with loglevel debug instead of warning.
• AMQP Result Backend: Now resets cached channel if the connection is lost.
• Polling results with the AMQP result backend was not working properly.
• Rate limits: No longer sleeps if there are no tasks, but rather waits for the task received condition (Performance improvement).
• ConfigurationView: `iter(dict)` should return keys, not items (Issue #362).
• celerybeat: PersistentScheduler now automatically removes a corrupted schedule file (Issue #346).
• Programs that doesn’t support positional command line arguments now provides a user friendly error message.
• Programs no longer tries to load the configuration file when showing `--version` (Issue #347).
• Autoscaler: The “all processes busy” log message is now severity debug instead of error.
• celeryd: If the message body can’t be decoded, it is now passed through `safe_str` when logging.
  This to ensure we don’t get additional decoding errors when trying to log the failure.
• `app.config_from_object/app.config_from_envvar` now works for all loaders.
• Now emits a user-friendly error message if the result backend name is unknown (Issue #349).
• `celery.contrib.batches`: Now sets loglevel and logfile in the task request so `task.get_logger` works with batch tasks (Issue #357).
• celeryd: An exception was raised if using the amqp transport and the prefetch count value exceeded 65535 (Issue #359).
  The prefetch count is incremented for every received task with an ETA/countdown defined. The prefetch count is a short, so can only support a maximum value of 65535. If the value exceeds the maximum value we now disable the prefetch count, it is re-enabled as soon as the value is below the limit again.
• cursesmon: Fixed unbound local error (Issue #303).
• eventlet/gevent is now imported on demand so autodoc can import the modules without having eventlet/gevent installed.
• celeryd: Ack callback now properly handles `AttributeError`.
• `Task.after_return` is now always called after the result has been written.
• Cassandra Result Backend: Should now work with the latest `pycassa` version.
• multiprocessing.Pool: No longer cares if the putlock semaphore is released too many times. (this can happen if one or more worker processes are killed).
• SQLAlchemy Result Backend: Now returns accidentally removed `date_done` again (Issue #325).
• Task.request context is now always initialized to ensure calling the task function directly works even if it actively uses the request context.
• Exception occurring when iterating over the result from `TaskSet.apply` fixed.
• eventlet: Now properly schedules tasks with an ETA in the past.
9.7 2.2.4

release-date 2011-02-19 12:00 AM CET

9.7.1 Fixes

- celeryd: 2.2.3 broke error logging, resulting in tracebacks not being logged.
- AMQP result backend: Polling task states did not work properly if there were more than one result message in the queue.
- TaskSet.apply_async() and TaskSet.apply() now supports an optional taskset_id keyword argument (Issue #331).
- The current taskset id (if any) is now available in the task context as request.taskset (Issue #329).
- SQLAlchemy result backend: date_done was no longer part of the results as it had been accidentally removed. It is now available again (Issue #325).
- SQLAlchemy result backend: Added unique constraint on Task.task_id and TaskSet.taskset_id. Tables needs to be recreated for this to take effect.
- Fixed exception raised when iterating on the result of TaskSet.apply().
- Tasks Userguide: Added section on choosing a result backend.

9.8 2.2.3

release-date 2011-02-12 04:00 P.M CET

9.8.1 Fixes

- Now depends on Kombu 1.0.3
- Task.retry now supports a max_retries argument, used to change the default value.
- multiprocessing.cpu_count may raise NotImplementedError on platforms where this is not supported (Issue #320).
- Coloring of log messages broke if the logged object was not a string.
- Fixed several typos in the init script documentation.
- A regression caused Task.exchange and Task.routing_key to no longer have any effect. This is now fixed.
- Routing Userguide: Fixes typo, routers in CELERY_ROUTES must be instances, not classes.
- celeryev did not create pidfile even though the --pidfile argument was set.
- Task logger format was no longer used. (Issue #317).

  The id and name of the task is now part of the log message again.

- A safe version of repr() is now used in strategic places to ensure objects with a broken __repr__ does not crash the worker, or otherwise make errors hard to understand (Issue #298).
- Remote control command active_queues: did not account for queues added at runtime.
In addition the dictionary replied by this command now has a different structure: the exchange key is now a dictionary containing the exchange declaration in full.

- The \(-Q\) option to \texttt{celeryd} removed unused queue declarations, so routing of tasks could fail.
  
  Queues are no longer removed, but rather \texttt{app.amqp.queues.consume_from()} is used as the list of queues to consume from.
  
  This ensures all queues are available for routing purposes.

- \texttt{celeryctl}: Now supports the \texttt{inspect active_queues} command.

### 9.9 2.2.2

**release-date** 2011-02-03 04:00 P.M CET

#### 9.9.1 Fixes

- Celerybeat could not read the schedule properly, so entries in \texttt{CELERYBEAT_SCHEDULE} would not be scheduled.
- Task error log message now includes \texttt{exc_info} again.
- The \texttt{eta} argument can now be used with \texttt{task.retry}.
  
  Previously it was overwritten by the countdown argument.
- \texttt{celeryd-multi/celeryd_detach}: Now logs errors occuring when executing the \texttt{celeryd} command.
- \texttt{daemonizing cookbook}: Fixed typo \texttt{--time-limit 300} -> \texttt{--time-limit=300}
- Colors in logging broke non-string objects in log messages.
- \texttt{setup_task_logger} no longer makes assumptions about magic task kwargs.

### 9.10 2.2.1

**release-date** 2011-02-02 04:00 P.M CET

#### 9.10.1 Fixes

- Eventlet pool was leaking memory (Issue #308).
- Deprecated function \texttt{celery.execute.delay_task} was accidentally removed, now available again.
- \texttt{BasePool.on_terminate} stub did not exist
- \texttt{celeryd detach}: Adds readable error messages if user/group name does not exist.
- Smarter handling of unicode decod errors when logging errors.

### 9.11 2.2.0

**release-date** 2011-02-01 10:00 AM CET
## 9.11.1 Important Notes

- **Carrot has been replaced with Kombu**

  Kombu is the next generation messaging framework for Python, fixing several flaws present in Carrot that was hard to fix without breaking backwards compatibility.

  Also it adds:
  - First-class support for virtual transports; Redis, Django ORM, SQLAlchemy, Beanstalk, MongoDB, CouchDB and in-memory.
  - Consistent error handling with introspection,
  - The ability to ensure that an operation is performed by gracefully handling connection and channel errors,
  - Message compression (zlib, bzip2, or custom compression schemes).

  This means that *ghettoq* is no longer needed as the functionality it provided is already available in Celery by default. The virtual transports are also more feature complete with support for exchanges (direct and topic). The Redis transport even supports fanout exchanges so it is able to perform worker remote control commands.

- **Magic keyword arguments pending deprecation.**

  The magic keyword arguments were responsible for many problems and quirks: notably issues with tasks and decorators, and name collisions in keyword arguments for the unaware.

  It wasn’t easy to find a way to deprecate the magic keyword arguments, but we think this is a solution that makes sense and it will not have any adverse effects for existing code.

  The path to a magic keyword argument free world is:
  - the *celery.decorators* module is deprecated and the decorators can now be found in *celery.task*.
  - The decorators in *celery.task* disables keyword arguments by default
  - All examples in the documentation have been changed to use *celery.task*.

  This means that the following will have magic keyword arguments enabled (old style):

  ```python
  from celery.decorators import task

  @task
  def add(x, y, **kwargs):
      print("In task %s" % kwargs["task_id"])  
      return x + y
  ```

  And this will not use magic keyword arguments (new style):

  ```python
  from celery.task import task

  @task
def add(x, y):
      print("In task %s" % add.request.id)  
      return x + y
  ```

  In addition, tasks can choose not to accept magic keyword arguments by setting the *task.accept_magic_kwargs* attribute.
Deprecation

Using the decorators in `celery.decorators` emits a `PendingDeprecationWarning` with a helpful message urging you to change your code, in version 2.4 this will be replaced with a `DeprecationWarning`, and in version 3.0 the `celery.decorators` module will be removed and no longer exist.

Similarly, the `task.accept_magic_kwargs` attribute will no longer have any effect starting from version 3.0.

- The magic keyword arguments are now available as `task.request`

  This is called the *context*. Using thread-local storage the context contains state that is related to the current request.

  It is mutable and you can add custom attributes that will only be seen by the current task request.

  The following context attributes are always available:

<table>
<thead>
<tr>
<th>Magic Keyword Argument</th>
<th>Replace with</th>
</tr>
</thead>
<tbody>
<tr>
<td>kwarg[&quot;task_id&quot;]</td>
<td>self.request.id</td>
</tr>
<tr>
<td>kwarg[&quot;delivery_info&quot;]</td>
<td>self.request.delivery_info</td>
</tr>
<tr>
<td>kwarg[&quot;task_retries&quot;]</td>
<td>self.request.retries</td>
</tr>
<tr>
<td>kwarg[&quot;logfile&quot;]</td>
<td>self.request.logfile</td>
</tr>
<tr>
<td>kwarg[&quot;loglevel&quot;]</td>
<td>self.request.loglevel</td>
</tr>
<tr>
<td>kwarg[&quot;task_is_eager&quot;]</td>
<td>self.request.is_eager</td>
</tr>
<tr>
<td>NEW</td>
<td>self.request.args</td>
</tr>
<tr>
<td>NEW</td>
<td>self.request.kwars</td>
</tr>
</tbody>
</table>

  In addition, the following methods now automatically uses the current context, so you don’t have to pass `kwarg` manually anymore:

  - `task.retry`
  - `task.get_logger`
  - `task.update_state`

- **Eventlet** support.

  This is great news for I/O-bound tasks!

  To change pool implementations you use the `-P | --pool` argument to `celeryd`, or globally using the `CELYRD_POOL` setting. This can be the full name of a class, or one of the following aliases: `processes`, `eventlet`, `gevent`.

  For more information please see the *Concurrency with Eventlet* section in the User Guide.

**Why not gevent?**

For our first alternative concurrency implementation we have focused on Eventlet, but there is also an experimental gevent pool available. This is missing some features, notably the ability to schedule ETA tasks.

Hopefully the gevent support will be feature complete by version 2.3, but this depends on user demand (and contributions).

- Python 2.4 support deprecated!

  We’re happy to announce that this is the last version to support Python 2.4.

  You are urged to make some noise if you’re currently stuck with Python 2.4. Complain to your package maintainers, sysadmins and bosses: tell them it’s time to move on!
Apart from wanting to take advantage of with-statements, coroutines, conditional expressions and enhanced try blocks, the code base now contains so many 2.4 related hacks and workarounds it’s no longer just a compromise, but a sacrifice.

If it really isn’t your choice, and you don’t have the option to upgrade to a newer version of Python, you can just continue to use Celery 2.2. Important fixes can be backported for as long as there is interest.

- **celeryd**: Now supports Autoscaling of child worker processes.

  The `--autoscale` option can be used to configure the minimum and maximum number of child worker processes:

  ```
  --autoscale=AUTOSCALE
  Enable autoscaling by providing max_concurrency,min_concurrency. Example:
  --autoscale=10,3 (always keep 3 processes, but grow to 10 if necessary).
  ```

- **Remote Debugging of Tasks**

  celery.contrib.rdb is an extended version of pdb that enables remote debugging of processes that does not have terminal access.

  Example usage:

  ```python
  from celery.contrib import rdb
  from celery.task import task

  @task
  def add(x, y):
      result = x + y
      rdb.set_trace() # <- set breakpoint
      return result
  ```

  `:func:`~celery.contrib.rdb.set_trace` sets a breakpoint at the current location and creates a socket you can telnet into to remotely debug your task.

  The debugger may be started by multiple processes at the same time, so rather than using a fixed port the debugger will search for an available port, starting from the base port (6900 by default). The base port can be changed using the environment variable :envvar:`CELERY_RDB_PORT`.

  By default the debugger will only be available from the local host, to enable access from the outside you have to set the environment variable :envvar:`CELERY_RDB_HOST`.

  When 'celeryd' encounters your breakpoint it will log the following information:

  ```
  [INFO/MainProcess] Got task from broker:
  tasks.add[d7261c71-4962-47e5-b342-2448bedd20e8]
  [WARNING/PoolWorker-1] Remote Debugger:6900:
  Please telnet 127.0.0.1 6900. Type 'exit' in session to continue.
  Waiting for client...
  ```
If you telnet the port specified you will be presented with a "pdb" shell:

```bash
$ telnet localhost 6900
Connected to localhost.
Escape character is '^]'.
> /opt/devel/demoapp/tasks.py(128)add()
-> return result
(Pdb)
```

Enter "help" to get a list of available commands,
It may be a good idea to read the 'Python Debugger Manual'_ if you have never used 'pdb' before.

- Events are now transient and is using a topic exchange (instead of direct).

  The CELERYD_EVENT_EXCHANGE, CELERYD_EVENT_ROUTING_KEY, CELERYD_EVENT_EXCHANGE_TYPE settings are no longer in use.

  This means events will not be stored until there is a consumer, and the events will be gone as soon as the consumer stops. Also it means there can be multiple monitors running at the same time.

  The routing key of an event is the type of event (e.g. worker.started, worker.heartbeat, task.succeeded, etc. This means a consumer can filter on specific types, to only be alerted of the events it cares about.

  Each consumer will create a unique queue, meaning it is in effect a broadcast exchange.

  This opens up a lot of possibilities, for example the workers could listen for worker events to know what workers are in the neighborhood, and even restart workers when they go down (or use this information to optimize tasks/autoscaling).

  **Note:** The event exchange has been renamed from "celeryevent" to "celeryev" so it does not collide with older versions.

  If you would like to remove the old exchange you can do so by executing the following command:

  ```bash
  $ camqadm exchange.delete celeryevent
  ```

- **celeryd** now starts without configuration, and configuration can be specified directly on the command line.

  Configuration options must appear after the last argument, separated by two dashes:

  ```bash
  $ celeryd -l info -I tasks -- broker.host=localhost broker.vhost=/app
  ```

- Configuration is now an alias to the original configuration, so changes to the original will reflect Celery at runtime.

- celery.conf has been deprecated, and modifying celery.conf.ALWAYS_EAGER will no longer have any effect.

  The default configuration is now available in the celery.app.defaults module. The available configuration options and their types can now be introspected.

- Remote control commands are now provided by kombu.pidbox, the generic process mailbox.

- Internal module celery.worker.listener has been renamed to celery.worker.consumer, and .CarrotListener is now .Consumer.

- Previously deprecated modules celery.models and celery.management.commands have now been removed as per the deprecation timeline.

Executing arbitrary code using pickle is a potential security issue if someone gains unrestricted access to the message broker.

If you really need this functionality, then you would have to add this to your own project.

• [Security: Low severity] The `stats` command no longer transmits the broker password.

One would have needed an authenticated broker connection to receive this password in the first place, but sniffing the password at the wire level would have been possible if using unencrypted communication.

9.11.2 News

• The internal module `celery.task.builtins` has been removed.

• The module `celery.task.schedules` is deprecated, and `celery.schedules` should be used instead.

For example if you have:

```python
from celery.task.schedules import crontab
```

You should replace that with:

```python
from celery.schedules import crontab
```

The module needs to be renamed because it must be possible to import schedules without importing the `celery.task` module.

• The following functions have been deprecated and is scheduled for removal in version 2.3:

  – `celery.execute.apply_async`
    Use `task.apply_async()` instead.

  – `celery.execute.apply`
    Use `task.apply()` instead.

  – `celery.execute.delay_task`
    Use `registry.tasks[name].delay()` instead.

• Importing `TaskSet` from `celery.task.base` is now deprecated.

  You should use:

  ```python
  >>> from celery.task import TaskSet
  ```

  instead.

• New remote control commands:

  – `active_queues`
    Returns the queue declarations a worker is currently consuming from.

• Added the ability to retry publishing the task message in the event of connection loss or failure.

  This is disabled by default but can be enabled using the `CELERY_TASK_PUBLISH_RETRY` setting, and tweaked by the `CELERY_TASK_PUBLISH_RETRY_POLICY` setting.

  In addition `retry`, and `retry_policy` keyword arguments have been added to `Task.apply_async`. 
Note: Using the retry argument to apply_async requires you to handle the publisher/connection manually.

- Periodic Task classes (@periodic_task/PeriodicTask) will not be deprecated as previously indicated in the source code.

  But you are encouraged to use the more flexible CELERYBEAT_SCHEDULE setting.

- Built-in daemonization support of celeryd using celeryd-multi is no longer experimental and is considered production quality.

  See Generic init scripts if you want to use the new generic init scripts.

- Added support for message compression using the CELERY_MESSAGE_COMPRESSION setting, or the compression argument to apply_async. This can also be set using routers.

- celeryd: Now logs stacktrace of all threads when receiving the SIGUSR1 signal. (Does not work on cPython 2.4, Windows or Jython).

  Inspired by https://gist.github.com/737056

- Can now remotely terminate/kill the worker process currently processing a task.

  The revoke remote control command now supports a terminate argument Default signal is TERM, but can be specified using the signal argument. Signal can be the uppercase name of any signal defined in the signal module in the Python Standard Library.

  Terminating a task also revokes it.

  Example:

  ```python
  >>> from celery.task.control import revoke
  >>> revoke(task_id, terminate=True)
  >>> revoke(task_id, terminate=True, signal="KILL")
  >>> revoke(task_id, terminate=True, signal="SIGKILL")
  ```

- TaskSetResult.join_native: Backend-optimized version of join().

  If available, this version uses the backends ability to retrieve multiple results at once, unlike join() which fetches the results one by one.

  So far only supported by the AMQP result backend. Support for memcached and Redis may be added later.

- Improved implementations of TaskSetResult.join andAsyncResult.wait.

  An interval keyword argument have been added to both so the polling interval can be specified (default interval is 0.5 seconds).

  A propagate keyword argument have been added to result.wait(), errors will be returned instead of raised if this is set to False.

  **Warning:** You should decrease the polling interval when using the database result backend, as frequent polling can result in high database load.

- The PID of the child worker process accepting a task is now sent as a field with the task-started event.

- The following fields have been added to all events in the worker class:
  - sw_ident: Name of worker software (e.g. celeryd).
  - sw_ver: Software version (e.g. 2.2.0).
- `sw_sys`: Operating System (e.g. Linux, Windows, Darwin).

- For better accuracy the start time reported by the multiprocessing worker process is used when calculating task duration.
  
  Previously the time reported by the accept callback was used.

- `celerybeat`: New built-in daemonization support using the `--detach` option.

- `celeryev`: New built-in daemonization support using the `--detach` option.

- `TaskSet.apply_async`: Now supports custom publishers by using the `publisher` argument.

- Added `CELERY_SEND_TASK_SENT_EVENT` setting.
  
  If enabled an event will be sent with every task, so monitors can track tasks before the workers receive them.

- `celerybeat`: Now reuses the broker connection when applying scheduled tasks.

- The configuration module and loader to use can now be specified on the command line.
  
  For example:
  
  ```bash
  $ celeryd --config=celeryconfig.py --loader=myloader.Loader
  ```

- Added signals: `beat_init` and `beat_embedded_init`
  
  - `celery.signals.beat_init`
    
    Dispatched when `celerybeat` starts (either standalone or embedded). Sender is the `celery.beat.Service` instance.
  
  - `celery.signals.beat_embedded_init`
    
    Dispatched in addition to the `beat_init` signal when `celerybeat` is started as an embedded process. Sender is the `celery.beat.Service` instance.

- Redis result backend: Removed deprecated settings `REDIS_TIMEOUT` and `REDIS_CONNECT_RETRY`.

- CentOS init script for `celeryd` now available in `contrib/centos`.

- Now depends on `pyparsing` version 1.5.0 or higher.
  
  There have been reported issues using Celery with pyparsing 1.4.x, so please upgrade to the latest version.

- Lots of new unit tests written, now with a total coverage of 95%.

### 9.11.3 Fixes

- `celeryev` Curses Monitor: Improved resize handling and UI layout (Issue #274 + Issue #276)

- AMQP Backend: Exceptions occurring while sending task results are now propagated instead of silenced. `celeryd` will then show the full traceback of these errors in the log.

- AMQP Backend: No longer deletes the result queue after successful poll, as this should be handled by the `CELERY_AMQP_TASK_RESULT_EXPIRES` setting instead.

- AMQP Backend: Now ensures queues are declared before polling results.

- Windows: celeryd: Show error if running with `-B` option.
  
  Running celerybeat embedded is known not to work on Windows, so users are encouraged to run celerybeat as a separate service instead.
• Windows: Utilities no longer output ANSI color codes on Windows
• camqadm: Now properly handles Ctrl+C by simply exiting instead of showing confusing traceback.
• Windows: All tests are now passing on Windows.
• Remove bin/ directory, and scripts section from setup.py.
  This means we now rely completely on setuptools entrypoints.

9.11.4 Experimental

• Jython: celeryd now runs on Jython using the threaded pool.
  All tests pass, but there may still be bugs lurking around the corners.
• PyPy: celeryd now runs on PyPy.
  It runs without any pool, so to get parallel execution you must start multiple instances (e.g. using celeryd-multi).
  Sadly an initial benchmark seems to show a 30% performance decrease on pypy-1.4.1 + JIT. We would like to find out why this is, so stay tuned.
• PublisherPool: Experimental pool of task publishers and connections to be used with the retry argument to apply_async.
  The example code below will re-use connections and channels, and retry sending of the task message if the connection is lost.

```python
from celery import current_app

# Global pool
pool = current_app().amqp.PublisherPool(limit=10)

def my_view(request):
    with pool.acquire() as publisher:
        add.apply_async((2, 2), publisher=publisher, retry=True)
```

9.12 2.1.4

release-date 2010-12-03 12:00 P.M CEST

9.12.1 Fixes

• Execution options to apply_async now takes precedence over options returned by active routers. This was a regression introduced recently (Issue #244).
• celeryev curses monitor: Long arguments are now truncated so curses doesn’t crash with out of bounds errors. (Issue #235).
• celeryd: Channel errors occurring while handling control commands no longer crash the worker but are instead logged with severity error.
• SQLAlchemy database backend: Fixed a race condition occurring when the client wrote the pending state. Just like the Django database backend, it does no longer save the pending state (Issue #261 + Issue #262).
• Error email body now uses `repr(exception)` instead of `str(exception)`, as the latter could result in Unicode decode errors (Issue #245).
• Error e-mail timeout value is now configurable by using the `EMAIL_TIMEOUT` setting.
• `celeryev`: Now works on Windows (but the curses monitor won’t work without having curses).
• Unit test output no longer emits non-standard characters.
• `celeryd`: The broadcast consumer is now closed if the connection is reset.
• `celeryd`: Now properly handles errors occurring while trying to acknowledge the message.
• `TaskRequest.on_failure` now encodes traceback using the current filesystem encoding. (Issue #286).
• `EagerResult` can now be pickled (Issue #288).

9.12.2 Documentation

• Adding `Contributing`.
• Added `Optimizing`.
• Added `Security` section to the FAQ.

9.13 2.1.3

  release-date 2010-11-09 05:00 P.M CEST
  • Fixed deadlocks in `timer2` which could lead to `djcelerymon/celeryev -c` hanging.
  • `EventReceiver`: now sends heartbeat request to find workers.
    This means `celeryev` and friends finds workers immediately at startup.
  • `celeryev cursesmon`: Set screen_delay to 10ms, so the screen refreshes more often.
  • Fixed pickling errors when pickling `AsyncResult` on older Python versions.
  • `celeryd`: prefetch count was decremented by eta tasks even if there were no active prefetch limits.

9.14 2.1.2

  release-data TBA

9.14.1 Fixes

• `celeryd`: Now sends the `task-retried` event for retried tasks.
• `celeryd`: Now honors ignore result for `WorkerLostError` and timeout errors.
• `celerybeat`: Fixed `UnboundLocalError` in `celerybeat` logging when using logging setup signals.
• `celeryd`: All log messages now includes `exc_info`.
9.15 2.1.1

release-date 2010-10-14 02:00 P.M CEST

9.15.1 Fixes

• Now working on Windows again.  
  Removed dependency on the pwd/grp modules.
• snapshots: Fixed race condition leading to loss of events.
• celdryd: Reject tasks with an eta that cannot be converted to a time stamp.
  See issue #209
• concurrency.processes.pool: The semaphore was released twice for each task (both at ACK and result ready).
  This has been fixed, and it is now released only once per task.
• docs/configuration: Fixed typo CELERYD_SOFT_TASK_TIME_LIMIT -> CELERYD_TASK_SOFT_TIME_LIMIT.
  See issue #214
• control command dump_scheduled: was using old .info attribute
• celdryd-multi: Fixed set changed size during iteration bug occurring in the restart command.
• celdryd: Accidentally tried to use additional command line arguments.
  This would lead to an error like:
  
got multiple values for keyword argument 'concurrency'.
  
Additional command line arguments are now ignored, and does not produce this error. However – we do reserve the right to use positional arguments in the future, so please do not depend on this behavior.
• celdrybeat: Now respects routers and task execution options again.
• celdrybeat: Now reuses the publisher instead of the connection.
• Cache result backend: Using float as the expires argument to cache.set is deprecated by the memcached libraries, so we now automatically cast to int.
• unit tests: No longer emits logging and warnings in test output.

9.15.2 News

• Now depends on carrot version 0.10.7.
• Added CELERY_REDIRECT_STDOUTS, and CELERYD_REDIRECT_STDOUTS_LEVEL settings.
  
  CELERY_REDIRECT_STDOUTS is used by celdryd and celdrybeat. All output to stdout and stderr will be redirected to the current logger if enabled.

  CELERY_REDIRECT_STDOUTS_LEVEL decides the log level used and is WARNING by default.
• Added CELERYBEAT_SCHEDULER setting.
This setting is used to define the default for the -S option to `celerybeat`.

Example:

```
CELERYBEAT_SCHEDULER = "djcelery.schedulers.DatabaseScheduler"
```

- Added Task.expires: Used to set default expiry time for tasks.
- New remote control commands: `add_consumer` and `cancel_consumer`.

```
add_consumer(queue, exchange, exchange_type, routing_key, **options)
```

Tells the worker to declare and consume from the specified declaration.

```
cancel_consumer(queue_name)
```

Tells the worker to stop consuming from queue (by queue name).

Commands also added to `celeryctl` and `inspect`.

Example using `celeryctl` to start consuming from queue “queue”, in exchange “exchange”, of type “direct” using binding key “key”:

```
$ celeryctl inspect add_consumer queue exchange direct key
```

```
$ celeryctl inspect cancel_consumer queue
```

See `celeryctl: Management Utility` for more information about the `celeryctl` program.

Another example using `inspect`:

```
>>> from celery.task.control import inspect
>>> inspect.add_consumer(queue="queue", exchange="exchange",
                        ... exchange_type="direct",
                        ... routing_key="key",
                        ... durable=False,
                        ... auto_delete=True)
```

```
>>> inspect.cancel_consumer("queue")
```

- `celerybeat`: Now logs the traceback if a message can’t be sent.
- `celerybeat`: Now enables a default socket timeout of 30 seconds.
- README/introduction/homepage: Added link to Flask-Celery.

## 9.16 2.1.0

**release-date**  2010-10-08 12:00 P.M CEST

### 9.16.1 Important Notes

- Celery is now following the versioning semantics defined by `semver`.

  This means we are no longer allowed to use odd/even versioning semantics By our previous versioning scheme this stable release should have been version 2.2.

- Now depends on Carrot 0.10.7.

- No longer depends on SQLAlchemy, this needs to be installed separately if the database result backend is used.
• django-celery now comes with a monitor for the Django Admin interface. This can also be used if you’re not a Django user. See Django Admin Monitor and Using outside of Django for more information.

• If you get an error after upgrading saying: `AttributeError: 'module' object has no attribute 'system'`,

   Then this is because the `celery.platform` module has been renamed to `celery.platforms` to not collide with the built-in `platform` module.

   You have to remove the old `platform.py` (and maybe `platform.pyc`) file from your previous Celery installation.

   To do this use `python` to find the location of this module:

   ```
   $ python
   >>> import celery.platform
   >>> celery.platform
   <module 'celery.platform' from '/opt/devel/celery/celery/platform.pyc'>
   
   Here the compiled module is in `/opt/devel/celery/celery/`, to remove the offending files do:
   ```

   `$ rm -f /opt/devel/celery/celery/platform.py*`

9.16.2 News

• Added support for expiration of AMQP results (requires RabbitMQ 2.1.0)

   The new configuration option `CELERY_AMQP_TASK_RESULT_EXPIRES` sets the expiry time in seconds (can be int or float):

   ```
   CELERY_AMQP_TASK_RESULT_EXPIRES = 30 * 60  # 30 minutes.
   CELERY_AMQP_TASK_RESULT_EXPIRES = 0.80  # 800 ms.
   ```

• celeryev: Event Snapshots

   If enabled, `celeryd` sends messages about what the worker is doing. These messages are called “events”. The events are used by real-time monitors to show what the cluster is doing, but they are not very useful for monitoring over a longer period of time. Snapshots lets you take “pictures” of the clusters state at regular intervals. This can then be stored in a database to generate statistics with, or even monitoring over longer time periods.

   django-celery now comes with a Celery monitor for the Django Admin interface. To use this you need to run the django-celery snapshot camera, which stores snapshots to the database at configurable intervals. See Using outside of Django for information about using this monitor if you’re not using Django.

   To use the Django admin monitor you need to do the following:

   1. Create the new database tables.

      ```
      $ python manage.py syncdb
      ```

   2. Start the django-celery snapshot camera:

      ```
      $ python manage.py celerycam
      ```

   3. Open up the django admin to monitor your cluster.

      The admin interface shows tasks, worker nodes, and even lets you perform some actions, like revoking and rate limiting tasks, and shutting down worker nodes.
There’s also a Debian init.d script for `celeryev` available, see *Running celeryd as a daemon* for more information.

New command line arguments to celeryev:

- `-c|--camera`: Snapshot camera class to use.
- `-f|--logfile`, `--logfile|-f`: Log file
- `-l|--loglevel`, `--loglevel|-l`: Log level
- `-r|--maxrate`, `--maxrate|-r`: Shutter rate limit.
- `-F|--freq`, `--freq|-F`: Shutter frequency

The `--camera` argument is the name of a class used to take snapshots with. It must support the interface defined by `celery.events.snapshot.Polaroid`.

Shutter frequency controls how often the camera thread wakes up, while the rate limit controls how often it will actually take a snapshot. The rate limit can be an integer (snapshots/s), or a rate limit string which has the same syntax as the task rate limit strings ("200/m", "10/s", "1/h", etc).

For the Django camera case, this rate limit can be used to control how often the snapshots are written to the database, and the frequency used to control how often the thread wakes up to check if there’s anything new.

The rate limit is off by default, which means it will take a snapshot for every `--frequency` seconds.

See also:

*Django Admin Monitor* and *Snapshots*.

- `broadcast()`: Added callback argument, this can be used to process replies immediately as they arrive.
- `celeryctl`: New command-line utility to manage and inspect worker nodes, apply tasks and inspect the results of tasks.

See also:

The `celeryctl: Management Utility` section in the *User Guide*.

Some examples:

```bash
$ celeryctl apply tasks.add -a '[2, 2]' --countdown=10
$ celeryctl inspect active
$ celeryctl inspect registered_tasks
$ celeryctl inspect scheduled
$ celeryctl inspect --help
$ celeryctl apply --help
```

- Added the ability to set an expiry date and time for tasks.

Example:

```python
>>> # Task expires after one minute from now.
>>> task.apply_async(args, kwags, expires=60)
>>> # Also supports datetime
>>> task.apply_async(args, kwags,
...                   expires=datetime.now() + timedelta(days=1))
```

When a worker receives a task that has been expired it will be marked as revoked (`celery.exceptions.TaskRevokedError`).
• Changed the way logging is configured.

We now configure the root logger instead of only configuring our custom logger. In addition we
don’t hijack the multiprocessing logger anymore, but instead use a custom logger name for different
applications:

<table>
<thead>
<tr>
<th>Application</th>
<th>Logger Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>celeryd</td>
<td>“celery”</td>
</tr>
<tr>
<td>celerybeat</td>
<td>“celery.beat”</td>
</tr>
<tr>
<td>celeryev</td>
<td>“celery.ev”</td>
</tr>
</tbody>
</table>

This means that the loglevel and logfile arguments will affect all registered loggers (even those from
3rd party libraries). Unless you configure the loggers manually as shown below, that is.

Users can choose to configure logging by subscribing to the :signal:`~celery.signals.setup_logging`
signal:

```python
from logging.config import fileConfig
from celery import signals

def setup_logging(**kwargs):
    fileConfig("logging.conf")
signals.setup_logging.connect(setup_logging)
```

If there are no receivers for this signal, the logging subsystem will be configured using the
--loglevel/--logfile argument, this will be used for all defined loggers.

Remember that celeryd also redirects stdout and stderr to the celery logger, if manually configure
logging you also need to redirect the stdouts manually:

```python
from logging.config import fileConfig
from celery import log

def setup_logging(**kwargs):
    import logging
    fileConfig("logging.conf")
    stdouts = logging.getLogger("mystdoutslogger")
    log.redirect_stdouts_to_logger(stdouts, loglevel=logging.WARNING)
```

• celeryd: Added command-line option -I/--include:

A comma separated list of (task) modules to be imported.

Example:

```
$ celeryd -I appl1.tasks,appl2.tasks
```

• celeryd: now emits a warning if running as the root user (euid is 0).

• celeryd.messaging.establish_connection(): Ability to override defaults used using keyword arg-
ument “defaults”.

• celeryd: Now uses multiprocessing.freeze_support() so that it should work with py2exe, PyInstaller,
cx_Freeze, etc.

• celeryd: Now includes more metadata for the STARTED state: PID and host name of the worker that started the
task.

See issue #181

• subtask: Merge additional keyword arguments to subtask() into task keyword arguments.

  e.g.:
Celery Documentation, Release 2.2.10

>>> s = subtask((1, 2), {"foo": "bar"}, baz=1)
>>> s.args
(1, 2)
>>> s.kwargs
{"foo": "bar", "baz": 1}

See issue #182.

- celeryd: Now emits a warning if there is already a worker node using the same name running on the same virtual host.
- AMQP result backend: Sending of results are now retried if the connection is down.
- **AMQP result backend**: `result.get()`: Wait for next state if state is **not** in `READY_STATES`.
- TaskSetResult now supports subscription.
  ```python
  >>> res = TaskSet(tasks).apply_async()
  >>> res[0].get()
  ```

- Added `Task.send_error_emails` + `Task.error_whitelist`, so these can be configured per task instead of just by the global setting.
- Added `Task.store_errors_even_if_ignored`, so it can be changed per Task, not just by the global setting.
- The crontab scheduler no longer wakes up every second, but implements `remaining_estimate` *(Optimization).*
- **celeryd**: Store **FAILURE** result if the `WorkerLostError` exception occurs (worker process disappeared).
- **celeryd**: Store **FAILURE** result if one of the `*TimeLimitExceeded` exceptions occurs.
- Refactored the periodic task responsible for cleaning up results.
  - The backend cleanup task is now only added to the schedule if `CELERY_TASK_RESULT_EXPIRES` is set.
  - If the schedule already contains a periodic task named “celery.backend_cleanup” it won’t change it, so the behavior of the backend cleanup task can be easily changed.
  - The task is now run every day at 4:00 AM, rather than every day since the first time it was run (using crontab schedule instead of `run_every`)
  - **Renamed** `celery.task.builtins.DeleteExpiredTaskMetaTask` -> `celery.task.builtins.backend_cleanup`
  - The task itself has been renamed from “celery.delete_expired_task_meta” to “celery.backend_cleanup”

  See issue #134.

- Implemented `AsyncResult.forget` for sqala/cache/redis/tyrant backends. (Forget and remove task result).

  See issue #184.

- **TaskSetResult.join**: Added `propagate=True` argument.
  When set to `False` exceptions occurring in subtasks will not be re-raised.
- Added `Task.update_state(task_id, state, meta)` as a shortcut to `task.backend.store_result(task_id, meta, state)`.
  The backend interface is “private” and the terminology outdated, so better to move this to `Task` so it can be used.
- **timer2**: Set `self.running=False` in `stop()` so it won’t try to join again on subsequent calls to `stop()`.
- Log colors are now disabled by default on Windows.

9.16. 2.1.0 145
• *celery.platform* renamed to *celery.platforms*, so it doesn’t collide with the built-in *platform* module.

• Exceptions occurring in Mediator+Pool callbacks are now caught and logged instead of taking down the worker.

• Redis result backend: Now supports result expiration using the Redis *EXPIRE* command.

• unit tests: Don’t leave threads running at tear down.

• celeryd: Task results shown in logs are now truncated to 46 chars.

• *Task._name___* is now an alias to *self.__class__.__name__*. This way tasks introspects more like regular functions.

• *Task.retry*: Now raises *TypeError* if *kwargs* argument is empty.
  
  See issue #164.

• *timedelta_seconds*: Use *timedelta.total_seconds* if running on Python 2.7

• *TokenBucket*: Generic Token Bucket algorithm

• *celery.events.state*: Recording of cluster state can now be paused and resumed, including support for buffering.
  
  ```python
  State.freeze(buffer=True)
  # Pauses recording of the stream.
  # If *buffer* is true, events received while being frozen will be buffered, and may be replayed later.
  
  State.thaw(replay=True)
  # Resumes recording of the stream.
  # If *replay* is true, then the recorded buffer will be applied.
  
  State.freeze_while(fun)
  # With a function to apply, freezes the stream before, and replays the buffer after the function returns.
  ```

• *EventReceiver.capture* Now supports a timeout keyword argument.

• celeryd: The mediator thread is now disabled if *CELERY_RATE_LIMITS* is enabled, and tasks are directly sent to the pool without going through the ready queue (*Optimization*).

### 9.16.3 Fixes

• Pool: Process timed out by *TimeoutHandler* must be joined by the Supervisor, so don’t remove it from the internal process list.
  
  See issue #192.

• *TaskPublisher.delay_task* now supports exchange argument, so exchange can be overridden when sending tasks in bulk using the same publisher
  
  See issue #187.

• celeryd no longer marks tasks as revoked if *CELERY_IGNORE_RESULT* is enabled.
  
  See issue #207.

• AMQP Result backend: Fixed bug with *result.get()* if *CELERY_TRACK_STARTED* enabled.
  
  *result.get()* would stop consuming after receiving the *STARTED* state.

• Fixed bug where new processes created by the pool supervisor becomes stuck while reading from the task Queue.
See http://bugs.python.org/issue10037

- Fixed timing issue when declaring the remote control command reply queue
  - This issue could result in replies being lost, but have now been fixed.
- Backward compatible LoggerAdapter implementation: Now works for Python 2.4.
  - Also added support for several new methods: fatal, makeRecord, _log, log, isEnabledFor, addHandler, removeHandler.

### 9.16.4 Experimental

- celeryd-multi: Added daemonization support.
  - celeryd-multi can now be used to start, stop and restart worker nodes.
    
    $ celeryd-multi start jerry elaine george kramer
    
    This also creates PID files and log files (celeryd@jerry.pid, ..., celeryd@jerry.log). To specify a location for these files use the --pidfile and --logfile arguments with the %n format:
    
    $ celeryd-multi start jerry elaine george kramer \
    --logfile=/var/log/celeryd@%n.log \
    --pidfile=/var/run/celeryd@%n.pid
    
    Stopping:
    
    $ celeryd-multi stop jerry elaine george kramer
    
    Restarting. The nodes will be restarted one by one as the old ones are shutdown:
    
    $ celeryd-multi restart jerry elaine george kramer
    
    Killing the nodes (WARNING: Will discard currently executing tasks):
    
    $ celeryd-multi kill jerry elaine george kramer
    
    See celeryd-multi help for help.

- celeryd-multi: start command renamed to show.
  - celeryd-multi start will now actually start and detach worker nodes. To just generate the commands you have to use celeryd-multi show.

- celeryd: Added --pidfile argument.
  - The worker will write its pid when it starts. The worker will not be started if this file exists and the pid contained is still alive.

- Added generic init.d script using celeryd-multi
  
  http://github.com/ask/celery/tree/master/contrib/generic-init.d/celeryd

### 9.16.5 Documentation

- Added User guide section: Monitoring
- Added user guide section: Periodic Tasks
  
  Moved from getting-started/periodic-tasks and updated.
- tutorials/external moved to new section: “community”.


• References has been added to all sections in the documentation.
  This makes it easier to link between documents.

## 9.17 2.0.3

**release-date**  2010-08-27 12:00 P.M CEST

### 9.17.1 Fixes

• celeryd: Properly handle connection errors happening while closing consumers.
• celeryd: Events are now buffered if the connection is down, then sent when the connection is re-established.
• No longer depends on the mailer package.
  This package had a name space collision with django-mailer, so its functionality was replaced.
• Redis result backend: Documentation typos: Redis doesn’t have database names, but database numbers. The default database is now 0.
• inspect: registered_tasks was requesting an invalid command because of a typo.
  See issue #170.
• CELERY_ROUTES: Values defined in the route should now have precedence over values defined in CELERY_QUEUES when merging the two.
  With the follow settings:

```python
CELERY_QUEUES = {"cpubound": {"exchange": "cpubound",
  "routing_key": "cpubound"}}

CELERY_ROUTES = {"tasks.add": {"queue": "cpubound",
  "routing_key": "tasks.add",
  "serializer": "json"}}
```

The final routing options for tasks.add will become:

```python
{"exchange": "cpubound",
 "routing_key": "tasks.add",
 "serializer": "json"}"
```

This was not the case before: the values in CELERY_QUEUES would take precedence.
• Worker crashed if the value of CELERY_TASK_ERROR_WHITELIST was not an iterable
• apply(): Make sure kwarg["task_id"] is always set.
•AsyncResult.traceback: Now returns None, instead of raising KeyError if traceback is missing.
• inspect: Replies did not work correctly if no destination was specified.
• Can now store result/metadata for custom states.
• celeryd: A warning is now emitted if the sending of task error e-mails fails.
• celeryev: Curses monitor no longer crashes if the terminal window is resized.
  See issue #160.
• celeryd: On OS X it is not possible to run os.exec* in a process that is threaded.
This breaks the SIGHUP restart handler, and is now disabled on OS X, emitting a warning instead.

See issue #152.

- `celery.execute.trace`: Properly handle `raise(str)`, which is still allowed in Python 2.4.
  
  See issue #175.

- Using urllib2 in a periodic task on OS X crashed because of the proxy auto detection used in OS X.
  
  This is now fixed by using a workaround. See issue #143.

- Debian init scripts: Commands should not run in a sub shell
  
  See issue #163.

- Debian init scripts: Use the absolute path of celeryd to allow stat
  
  See issue #162.

### 9.17.2 Documentation

- `getting-started/broker-installation`: Fixed typo
  
  ```
  set_permissions "" -> set_permissions ".*".
  ```

- Tasks User Guide: Added section on database transactions.
  
  See issue #169.

  
  See issue #169.

- Documented the default values for the `CELERYD_CONCURRENCY` and `CELERYD_PREFETCH_MULTIPLIER` settings.

- Tasks User Guide: Fixed typos in the subtask example

- celery.signals: Documented worker_process_init.

- Daemonization cookbook: Need to export DJANGO_SETTINGS_MODULE in `/etc/default/celeryd`.

- Added some more FAQs from stack overflow

- Daemonization cookbook: Fixed typo `CELERYD_LOGFILE/CELERYD_PIDFILE` to `CELERYD_LOG_FILE / CELERYD_PID_FILE`
  
  Also added troubleshooting section for the init scripts.

### 9.18 2.0.2

- `release-date` 2010-07-22 11:31 A.M CEST

- Routes: When using the dict route syntax, the exchange for a task could disappear making the task unroutable.
  
  See issue #158.

- Test suite now passing on Python 2.4

- No longer have to type `PYTHONPATH=.` to use celeryconfig in the current directory.
This is accomplished by the default loader ensuring that the current directory is in `sys.path` when loading the config module. `sys.path` is reset to its original state after loading.

Adding the current working directory to `sys.path` without the user knowing may be a security issue, as this means someone can drop a Python module in the users directory that executes arbitrary commands. This was the original reason not to do this, but if done only when loading the config module, this means that the behavior will only apply to the modules imported in the config module, which I think is a good compromise (certainly better than just explicitly setting `PYTHONPATH=`, anyway)

- Experimental Cassandra backend added.
- `celeryd`: SIGHUP handler accidentally propagated to worker pool processes.
  
  In combination with `7a7c44e39344789f11b5346e9cc8340f5fe4846c` this would make each child process start a new `celeryd` when the terminal window was closed :/
- `celeryd`: Do not install SIGHUP handler if running from a terminal.
  
  This fixes the problem where `celeryd` is launched in the background when closing the terminal.
- `celeryd`: Now joins threads at shutdown.
  
  See issue #152.
- Test tear down: Don’t use `atexit` but nose’s `teardown()` functionality instead.
  
  See issue #154.
- Debian init script for `celeryd`: Stop now works correctly.
- Task logger: `warn` method added (synonym for `warning`)
- Can now define a white list of errors to send error e-mails for.
  
  Example:
  ```python
  CELERY_TASK_ERROR_WHITELIST = ('myapp.MalformedInputError')
  ```
  
  See issue #153.
- `celeryd`: Now handles overflow exceptions in `time.mktime` while parsing the ETA field.
- LoggerWrapper: Try to detect loggers logging back to stderr/stdout making an infinite loop.
- **Added** `celery.task.control.inspect`: Inspects a running worker.

  Examples:
  ```python
  # Inspect a single worker
  >>> i = inspect("myworker.example.com")

  # Inspect several workers
  >>> i = inspect(['myworker.example.com', 'myworker2.example.com'])

  # Inspect all workers consuming on this vhost.
  >>> i = inspect()

  ### Methods
  # Get currently executing tasks
  >>> i.active()

  # Get currently reserved tasks
  >>> i.reserved()
  ```
# Get the current eta schedule
>>> i.scheduled()

# Worker statistics and info
>>> i.stats()

# List of currently revoked tasks
>>> i.revoked()

# List of registered tasks
>>> i.registered_tasks()

- Remote control commands `dump_active`/`dump_reserved`/`dump_schedule` now replies with detailed task requests.
  Containing the original arguments and fields of the task requested.
  In addition the remote control command `set_loglevel` has been added, this only changes the log level for the main process.

- Worker control command execution now catches errors and returns their string representation in the reply.

- Functional test suite added
  
  `celery.tests.functional.case` contains utilities to start and stop an embedded celeryd process, for use in functional testing.

---

9.19 2.0.1

**release-date** 2010-07-09 03:02 P.M CEST

- `multiprocessing.pool`: Now handles encoding errors, so that pickling errors doesn’t crash the worker processes.

- The remote control command replies was not working with RabbitMQ 1.8.0’s stricter equivalence checks.
  
  If you’ve already hit this problem you may have to delete the declaration:
  
  ```
  $ camqadm exchange.delete celerycrq
  ```

  or:
  
  ```
  $ python manage.py camqadm exchange.delete celerycrq
  ```

- A bug sneaked in the ETA scheduler that made it only able to execute one task per second(!)
  
  The scheduler sleeps between iterations so it doesn’t consume too much CPU. It keeps a list of the scheduled items sorted by time, at each iteration it sleeps for the remaining time of the item with the nearest deadline. If there are no eta tasks it will sleep for a minimum amount of time, one second by default.
  
  A bug sneaked in here, making it sleep for one second for every task that was scheduled. This has been fixed, so now it should move tasks like hot knife through butter.
  
  In addition a new setting has been added to control the minimum sleep interval: `CELERYD_ETA_SCHEDULER_PRECISION`. A good value for this would be a float between 0 and 1, depending on the needed precision. A value of 0.8 means that when the ETA of a task is met, it will take at most 0.8 seconds for the task to be moved to the ready queue.

- `Pool`: Supervisor did not release the semaphore.
  
  This would lead to a deadlock if all workers terminated prematurely.
• Added Python version trove classifiers: 2.4, 2.5, 2.6 and 2.7
• Tests now passing on Python 2.7.
• Task.__reduce__: Tasks created using the task decorator can now be pickled.
• setup.py: nose added to tests_require.
• Pickle should now work with SQLAlchemy 0.5.x
• New homepage design by Jan Henrik Helmers: http://celeryproject.org
• New Sphinx theme by Armin Ronacher: http://docs.celeryproject.org/
• Fixed “pending_xref” errors shown in the HTML rendering of the documentation. Apparently this was caused by new changes in Sphinx 1.0b2.
• Router classes in CELERY_ROUTES are now imported lazily.
  Importing a router class in a module that also loads the Celery environment would cause a circular dependency. This is solved by importing it when needed after the environment is set up.
• CELERY_ROUTES was broken if set to a single dict.
  This example in the docs should now work again:
  
  CELERY_ROUTES = {"feed.tasks.import_feed": "feeds"}
• CREATE_MISSING_QUEUES was not honored by apply_async.
• New remote control command: stats
  Dumps information about the worker, like pool process ids, and total number of tasks executed by type.
  Example reply:
  
  ```
  [{'worker.local':
    'total': {'tasks.sleeptask': 6},
    'pool': {'timeouts': [None, None],
             'processes': [60376, 60377],
             'max-concurrency': 2,
             'max-tasks-per-child': None,
             'put-guarded-by-semaphore': True}}]
  ```
• New remote control command: dump_active
  Gives a list of tasks currently being executed by the worker. By default arguments are passed through repr in case there are arguments that is not JSON encodable. If you know the arguments are JSON safe, you can pass the argument safe=True.
  Example reply:

  ```python
  >>> broadcast("dump_active", arguments={"safe": False}, reply=True)
  ```

  ```
  {[{'worker.local': [
    {'args': '(1,)','
     'time_start': 1278580542.6300001,'
     'name': 'tasks.sleeptask',
     'delivery_info': {
      'consumer_tag': '30',
      'routing_key': 'celery',
      'exchange': 'celery'},
     'hostname': 'casper.local',
     'acknowledged': True,
     'kwargs': '{}',
  ]]}
  ```
• Added experimental support for persistent revokes.

  Use the `-S|--statedb` argument to `celeryd` to enable it:

  $ celeryd --statedb=/var/run/celeryd

  This will use the file: `/var/run/celeryd.db`, as the `shelve` module automatically adds the `.db` suffix.

9.20 2.0.0

**release-date** 2010-07-02 02:30 P.M CEST

9.20.1 Foreword

Celery 2.0 contains backward incompatible changes, the most important being that the Django dependency has been removed so Celery no longer supports Django out of the box, but instead as an add-on package called `django-celery`. We’re very sorry for breaking backwards compatibility, but there’s also many new and exciting features to make up for the time you lose upgrading, so be sure to read the *News* section.

Quite a lot of potential users have been upset about the Django dependency, so maybe this is a chance to get wider adoption by the Python community as well.

Big thanks to all contributors, testers and users!

9.20.2 Upgrading for Django-users

Django integration has been moved to a separate package: `django-celery`.

• To upgrade you need to install the `django-celery` module and change:

  `INSTALLED_APPS = "celery"

  to:

  `INSTALLED_APPS = "djcelery"

• If you use `mod_wsgi` you need to add the following line to your `.wsgi` file:

  ```python
  import os
  os.environ["CELERY_LOADER"] = "django"
  ```

• The following modules has been moved to `django-celery`:
Importing `djcelery` will automatically setup Celery to use Django loader. It does this by setting the `CELERY_LOADER` environment variable to "django" (it won’t change it if a loader is already set.)

When the Django loader is used, the “database” and “cache” result backend aliases will point to the `djcelery` backends instead of the built-in backends, and configuration will be read from the Django settings.

### 9.20.3 Upgrading for others

#### Database result backend

The database result backend is now using SQLAlchemy instead of the Django ORM, see Supported Databases for a table of supported databases.

The `DATABASE_` settings has been replaced by a single setting: `CELERY_RESULT_DBURI`. The value here should be an SQLAlchemy Connection String, some examples include:

```python
# sqlite (filename)
CELERY_RESULT_DBURI = "sqlite:///celerydb.sqlite"

# mysql
CELERY_RESULT_DBURI = "mysql://scott:tiger@localhost/foo"

# postgresql
CELERY_RESULT_DBURI = "postgresql://scott:tiger@localhost/mydatabase"

# oracle
CELERY_RESULT_DBURI = "oracle://scott:tiger@127.0.0.1:1521/sidname"
```

See SQLAlchemy Connection Strings for more information about connection strings.

To specify additional SQLAlchemy database engine options you can use the `CELERY_RESULT_ENGINE_OPTIONS` setting:

```python
# echo enables verbose logging from SQLAlchemy.
CELERY_RESULT_ENGINE_OPTIONS = {"echo": True}
```

#### Cache result backend

The cache result backend is no longer using the Django cache framework, but it supports mostly the same configuration syntax:

```python
CELERY_CACHE_BACKEND = "memcached://A.example.com:11211;B.example.com"
```

To use the cache backend you must either have the `pylibmc` or `python-memcached` library installed, of which the former is regarded as the best choice.
The support backend types are `memcached://` and `memory://`, we haven’t felt the need to support any of the other backends provided by Django.

### 9.20.4 Backward incompatible changes

- Default (python) loader now prints warning on missing `celeryconfig.py` instead of raising `ImportError`. `celeryd` raises `ImproperlyConfigured` if the configuration is not set up. This makes it possible to use `–help` etc., without having a working configuration.

  Also this makes it possible to use the client side of celery without being configured:

  ```python
  >>> from carrot.connection import BrokerConnection
  >>> conn = BrokerConnection("localhost", "guest", "guest", "/")
  >>> from celery.execute import send_task
  >>> r = send_task("celery.ping", args=(), kwargs={}, connection=conn)
  >>> from celery.backends.amqp import AMQPBackend
  >>> r.backend = AMQPBackend(connection=conn)
  >>> r.get()
  'pong'
  ```

- The following deprecated settings has been removed (as scheduled by the deprecation timeline):

<table>
<thead>
<tr>
<th>Setting name</th>
<th>Replace with</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>CELERY_AMQP_CONSUMERQUEUES</code></td>
<td><code>CELERY_QUEUES</code></td>
</tr>
<tr>
<td><code>CELERY_AMQP_EXCHANGE</code></td>
<td><code>CELERY_DEFAULT_EXCHANGE</code></td>
</tr>
<tr>
<td><code>CELERY_AMQP_EXCHANGE_TYPE</code></td>
<td><code>CELERY_DEFAULT_EXCHANGE_TYPE</code></td>
</tr>
<tr>
<td><code>CELERY_AMQP_CONSUMER_ROUTING_KEY</code></td>
<td><code>CELERY_QUEUES</code></td>
</tr>
<tr>
<td><code>CELERY_AMQP_PUBLISHER_ROUTING_KEY</code></td>
<td><code>CELERY_DEFAULT_ROUTING_KEY</code></td>
</tr>
</tbody>
</table>

- The `celery.task.rest` module has been removed, use `celery.task.http` instead (as scheduled by the deprecation timeline).

- It’s no longer allowed to skip the class name in loader names. (as scheduled by the deprecation timeline):

  Assuming the implicit `Loader` class name is no longer supported, if you use e.g.:

  ```python
  CELERY_LOADER = "myapp.loaders"
  ```

  You need to include the loader class name, like this:

  ```python
  CELERY_LOADER = "myapp.loaders.Loader"
  ```

- `CELERY_TASK_RESULT_EXPIRES` now defaults to 1 day.

  Previous default setting was to expire in 5 days.

- AMQP backend: Don’t use different values for `auto_delete`.

  This bug became visible with RabbitMQ 1.8.0, which no longer allows conflicting declarations for the `auto_delete` and `durable` settings.

  If you’ve already used celery with this backend chances are you have to delete the previous declaration:

  ```text
  $ camqadm exchange.delete celeryresults
  ```

- Now uses pickle instead of cPickle on Python versions <= 2.5

  cPickle is broken in Python <= 2.5.

  It unsafely and incorrectly uses relative instead of absolute imports, so e.g.:
exceptions.KeyError

becomes:

celery.exceptions.KeyError

Your best choice is to upgrade to Python 2.6, as while the pure pickle version has worse performance, it is the only safe option for older Python versions.

9.20.5 News

• **celeryev**: Curses Celery Monitor and Event Viewer.

  This is a simple monitor allowing you to see what tasks are executing in real-time and investigate tracebacks and results of ready tasks. It also enables you to set new rate limits and revoke tasks.

  Screenshot:

  ![Celery Monitor Screenshot]

  If you run `celeryev` with the `-d` switch it will act as an event dumper, simply dumping the events it receives to standard out:

  ```
  $ celeryev -d
  -> celeryev: starting capture...
  casper.local [2010-06-04 10:42:07.020000] heartbeat
  casper.local [2010-06-04 10:42:14.750000] task received:
  ```
Celery Documentation, Release 2.2.10

tasks.add(61a68756-27f4-4879-b816-3cf815672b0e) args=[2, 2] kwargs={}
eta=2010-06-04T10:42:16.669290, retries=0
casper.local [2010-06-04 10:42:17.230000] task started
tasks.add(61a68756-27f4-4879-b816-3cf815672b0e) args=[2, 2] kwargs={}
casper.local [2010-06-04 10:42:17.960000] task succeeded:
tasks.add(61a68756-27f4-4879-b816-3cf815672b0e)
args=[2, 2] kwargs={} result=4, runtime=0.782663106918

The fields here are, in order: *sender hostname*, *timestamp*, *event type* and *additional event fields*.

- AMQP result backend: Now supports .ready(), .successful(), .result, .status, and even responds to changes in task state
- New user guides:
  - Workers Guide
  - Sets of tasks, Subtasks and Callbacks
  - Routing Tasks
- celeryd: Standard out/error is now being redirected to the log file.
- billiard has been moved back to the celery repository.

<table>
<thead>
<tr>
<th>Module name</th>
<th>celery equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>billiard.pool</td>
<td>celery.concurrency.processes.pool</td>
</tr>
<tr>
<td>billiard.serialization</td>
<td>celery.serialization</td>
</tr>
<tr>
<td>billiard.utils.functional</td>
<td>celery.utils.functional</td>
</tr>
</tbody>
</table>

The billiard distribution may be maintained, depending on interest.

- now depends on carrot >= 0.10.5
- now depends on pyparsing
- celeryd: Added –purge as an alias to –discard.
- celeryd: Ctrl+C (SIGINT) once does warm shutdown, hitting Ctrl+C twice forces termination.
- Added support for using complex crontab-expressions in periodic tasks. For example, you can now use:

  >>> crontab(minute="*/15")

  or even:

  >>> crontab(minute="*/30", hour="8-17,1-2", day_of_week="thu-fri")

  See Periodic Tasks.

- celeryd: Now waits for available pool processes before applying new tasks to the pool.

  This means it doesn’t have to wait for dozens of tasks to finish at shutdown because it has applied prefetched tasks without having any pool processes available to immediately accept them.

  See issue #122.

- New built-in way to do task callbacks using subtask.

  See Sets of tasks, Subtasks and Callbacks for more information.

- TaskSets can now contain several types of tasks.

  TaskSet has been refactored to use a new syntax, please see Sets of tasks, Subtasks and Callbacks for more information.
The previous syntax is still supported, but will be deprecated in version 1.4.

- TaskSet failed() result was incorrect.
  
  See issue #132.

- Now creates different loggers per task class.
  
  See issue #129.

- Missing queue definitions are now created automatically.

  You can disable this using the `CELERY_CREATE_MISSING_QUEUES` setting.

  The missing queues are created with the following options:

  ```python
  CELERY_QUEUES[name] = {"exchange": name,
                         "exchange_type": "direct",
                         "routing_key": "name"
  }
  ```

  This feature is added for easily setting up routing using the `-Q` option to `celeryd`:

  $ celeryd -Q video, image

  See the new routing section of the User Guide for more information: Routing Tasks.

- New Task option: `Task.queue`

  If set, message options will be taken from the corresponding entry in `CELERY_QUEUES`, `exchange`, `exchange_type` and `routing_key` will be ignored.

- Added support for task soft and hard time limits.

  New settings added:

  - `CELERYD_TASK_TIME_LIMIT`
    
    Hard time limit. The worker processing the task will be killed and replaced with a new one when this is exceeded.

  - `CELERYD_SOFT_TASK_TIME_LIMIT`
    
    Soft time limit. The `celery.exceptions.SoftTimeLimitExceeded` exception will be raised when this is exceeded. The task can catch this to e.g. clean up before the hard time limit comes.

  New command line arguments to `celeryd` added: `--time-limit` and `--soft-time-limit`.

  What’s left?

  This won’t work on platforms not supporting signals (and specifically the `SIGUSR1` signal) yet. So an alternative the ability to disable the feature all together on nonconforming platforms must be implemented.

  Also when the hard time limit is exceeded, the task result should be a `TimeLimitExceeded` exception.

- Test suite is now passing without a running broker, using the carrot in-memory backend.

- Log output is now available in colors.

<table>
<thead>
<tr>
<th>Log level</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBUG</td>
<td>Blue</td>
</tr>
<tr>
<td>WARNING</td>
<td>Yellow</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Magenta</td>
</tr>
<tr>
<td>ERROR</td>
<td>Red</td>
</tr>
</tbody>
</table>
This is only enabled when the log output is a tty. You can explicitly enable/disable this feature using the `CELERYD_LOG_COLOR` setting.

- Added support for task router classes (like the django multi-db routers)
  - New setting: `CELERY_ROUTES`
    
    This is a single, or a list of routers to traverse when sending tasks. Dictionaries in this list converts to a `celery.routes.MapRoute` instance.

    Examples:
    ```
    >>> CELERY_ROUTES = {
        "celery.ping": "default",
        "mytasks.add": "cpu-bound",
        "video.encode": {
            "queue": "video",
            "exchange": "media",
            "routing_key": "media.video.encode"
        }
    }
    >>> CELERY_ROUTES = ("myapp.tasks.Router",
        ("celery.ping": "default"))
    ```

    Where `myapp.tasks.Router` could be:

    ```
    class Router(object):
        
        def route_for_task(self, task, args=None, kwargs=None):
            if task == "celery.ping":
                return "default"
    ```

    route_for_task may return a string or a dict. A string then means it’s a queue name in `CELERY_QUEUES`, a dict means it’s a custom route.

    When sending tasks, the routers are consulted in order. The first router that doesn’t return `None` is the route to use. The message options is then merged with the found route settings, where the routers settings have priority.

    Example if `apply_async()` has these arguments:
    ```
    >>> Task.apply_async(immediate=False, exchange="video",
        ... routing_key="video.compress")
    ```

    and a router returns:
    ```
    {"immediate": True,
        "exchange": "urgent"}
    ```

    the final message options will be:
    ```
    immediate=True, exchange="urgent", routing_key="video.compress"
    ```

    (and any default message options defined in the Task class)

- New Task handler called after the task returns: `after_return()`.

- `ExceptionInfo` now passed to `on_retry()`/`on_failure()` as einfo keyword argument.

- `celeryd`: Added `CELERYD_MAX_TASKS_PER_CHILD/--maxtasksperchild`

  Defines the maximum number of tasks a pool worker can process before the process is terminated and replaced by a new one.

- Revoked tasks now marked with state `REMOVED`, and `result.get()` will now raise `TaskRevokedError`. 
• celery.task.control.ping() now works as expected.

• apply(throw=True) / CELERY_EAGER_PROPAGATES_EXCEPTIONS: Makes eager execution re-raise task errors.

• New signal: ~celery.signals.worker_process_init: Sent inside the pool worker process at init.

• celeryd -Q option: Ability to specify list of queues to use, disabling other configured queues.

  For example, if CELERY_QUEUES defines four queues: image, video, data and default, the following command would make celeryd only consume from the image and video queues:

  $ celeryd -Q image,video

• celeryd: New return value for the revoke control command:

  Now returns:

  

  

  instead of True.

• celeryd: Can now enable/disable events using remote control

  Example usage:

  >>> from celery.task.control import broadcast
  >>> broadcast("enable_events")
  >>> broadcast("disable_events")

• Removed top-level tests directory. Test config now in celery.tests.config

  This means running the unit tests doesn’t require any special setup. celery/tests/__init__ now configures the CELERY_CONFIG_MODULE and CELERY_LOADER environment variables, so when nosetests imports that, the unit test environment is all set up.

  Before you run the tests you need to install the test requirements:

  $ pip install -r contrib/requirements/test.txt

  Running all tests:

  $ nosetests

  Specifying the tests to run:

  $ nosetests celery.tests.test_task

  Producing HTML coverage:

  $ nosetests --with-coverage3

    The coverage output is then located in celery/tests/cover/index.html.

• celeryd: New option --version: Dump version info and exit.

• celeryd-multi: Tool for shell scripts to start multiple workers.

  Some examples:

  # Advanced example with 10 workers:
  #  * Three of the workers processes the images and video queue
  #  * Two of the workers processes the data queue with loglevel DEBUG
  #  * the rest processes the default’ queue.
  $ celeryd-multi start 10 -l INFO -Q:1-3 images,video -Q:4,5:default
# get commands to start 10 workers, with 3 processes each
$ celeryd-multi start 3 -c 3
  celeryd -n celeryd1.myhost -c 3
celeryd -n celeryd2.myhost -c 3
celeryd -n celeryd3.myhost -c 3

# start 3 named workers
$ celeryd-multi start image video data -c 3
celeryd -n image.myhost -c 3
celeryd -n video.myhost -c 3
celeryd -n data.myhost -c 3

# specify custom hostname
$ celeryd-multi start 2 -n worker.example.com -c 3
celeryd -n celeryd1.worker.example.com -c 3
celeryd -n celeryd2.worker.example.com -c 3

# Additionl options are added to each celeryd',
# but you can also modify the options for ranges of or single workers

# 3 workers: Two with 3 processes, and one with 10 processes.
$ celeryd-multi start 3 -c 3 -c:1 10
celeryd -n celeryd1.myhost -c 10
celeryd -n celeryd2.myhost -c 3
celeryd -n celeryd3.myhost -c 3

# can also specify options for named workers
$ celeryd-multi start image video data -c 3 -c:image 10
celeryd -n image.myhost -c 10
celeryd -n video.myhost -c 3
celeryd -n data.myhost -c 3

# ranges and lists of workers in options is also allowed:
# (-c:1-3 can also be written as -c:1,2,3)
$ celeryd-multi start 5 -c 3 -c:1-3 10
celeryd-multi -n celeryd1.myhost -c 10
celeryd-multi -n celeryd2.myhost -c 10
celeryd-multi -n celeryd3.myhost -c 10
celeryd-multi -n celeryd4.myhost -c 3
celeryd-multi -n celeryd5.myhost -c 3

# lists also works with named workers
$ celeryd-multi start foo bar baz xuzzy -c 3 -c:foo,bar,baz 10
celeryd-multi -n foo.myhost -c 10
celeryd-multi -n bar.myhost -c 10
celeryd-multi -n baz.myhost -c 10
celeryd-multi -n xuzzy.myhost -c 3

• The worker now calls the result backends process_cleanup method after task execution instead of before.
• AMQP result backend now supports Pika.

9.21 1.0.6

release-date 2010-06-30 09:57 A.M CEST
• RabbitMQ 1.8.0 has extended their exchange equivalence tests to include `auto_delete` and `durable`. This broke the AMQP backend.

If you’ve already used the AMQP backend this means you have to delete the previous definitions:

```bash
$ camqadm exchange.delete celeryresults
```

or:

```bash
$ python manage.py camqadm exchange.delete celeryresults
```

### 9.22 1.0.5

**release-date** 2010-06-01 02:36 P.M CEST

#### 9.22.1 Critical

• SIGINT/Ctrl+C killed the pool, abruptly terminating the currently executing tasks.

  Fixed by making the pool worker processes ignore `SIGINT`.

• Should not close the consumers before the pool is terminated, just cancel the consumers.

  See issue #122.

• Now depends on `billiard` >= 0.3.1

• celeryd: Previously exceptions raised by worker components could stall startup, now it correctly logs the exceptions and shuts down.

• celeryd: Prefetch counts was set too late. QoS is now set as early as possible, so celeryd can’t slurp in all the messages at start-up.

#### 9.22.2 Changes

• **celery.contrib.abortable:** Abortable tasks.

  Tasks that defines steps of execution, the task can then be aborted after each step has completed.

• **EventDispatcher:** No longer creates AMQP channel if events are disabled

• Added required RPM package names under `[bdist_rpm]` section, to support building RPMs from the sources using `setup.py`

• Running unit tests: `NOSE_VERBOSE` environment var now enables verbose output from Nose.

• `celery.execute.apply()` : Pass log file/log level arguments as task kwargs.

  See issue #110.

• `celery.execute.apply`: Should return exception, not `ExceptionInfo` on error.

  See issue #111.

• Added new entries to the **FAQs:**

  – Should I use retry or acks_late?

  – Can I execute a task by name?
9.23 1.0.4

release-date 2010-05-31 09:54 A.M CEST

- Changelog merged with 1.0.5 as the release was never announced.

9.24 1.0.3

release-date 2010-05-15 03:00 P.M CEST

9.24.1 Important notes

- Messages are now acknowledged *just before* the task function is executed.
  
  This is the behavior we’ve wanted all along, but couldn’t have because of limitations in the multiprocessing module. The previous behavior was not good, and the situation worsened with the release of 1.0.1, so this change will definitely improve reliability, performance and operations in general.

  For more information please see http://bit.ly/9hom6T

- Database result backend: result now explicitly sets `null=True` as `django-picklefield` version 0.1.5 changed the default behavior right under our noses :(
    
    See: http://bit.ly/d5OwMr

    This means those who created their celery tables (via syncdb or celeryinit) with picklefield versions
    >= 0.1.5 has to alter their tables to allow the result field to be *NULL* manually.

    MySQL:
    
    ALTER TABLE celery_taskmeta MODIFY result TEXT NULL

    PostgreSQL:
    
    ALTER TABLE celery_taskmeta ALTER COLUMN result DROP NOT NULL

- Removed `Task.rate_limit_queue_type`, as it was not really useful and made it harder to refactor some parts.

- Now depends on carrot >= 0.10.4

- Now depends on billiard >= 0.3.0

9.24.2 News

- AMQP backend: Added timeout support for `result.get() / result.wait()`.

- New task option: `Task.acks_late` (default: `CELERY_ACKS_LATE`)

  Late ack means the task messages will be acknowledged **after** the task has been executed, not *just before*, which is the default behavior.

  **Note:** This means the tasks may be executed twice if the worker crashes in mid-execution. Not acceptable for most applications, but desirable for others.

- Added crontab-like scheduling to periodic tasks.
Like a cron job, you can specify units of time of when you would like the task to execute. While not a full implementation of cron’s features, it should provide a fair degree of common scheduling needs.

You can specify a minute (0-59), an hour (0-23), and/or a day of the week (0-6 where 0 is Sunday, or by names: sun, mon, tue, wed, thu, fri, sat).

Examples:

```python
from celery.schedules import crontab
from celery.decorators import periodic_task

@periodic_task(run_every=crontab(hour=7, minute=30))
def every_morning():
    print("Runs every morning at 7:30a.m")

@periodic_task(run_every=crontab(hour=7, minute=30, day_of_week="mon"))
def every_monday_morning():
    print("Run every monday morning at 7:30a.m")

@periodic_task(run_every=crontab(minutes=30))
def every_hour():
    print("Runs every hour on the clock. e.g. 1:30, 2:30, 3:30 etc.")
```

**Note:** This a late addition. While we have unitests, due to the nature of this feature we haven’t been able to completely test this in practice, so consider this experimental.

- `TaskPool.apply_async`: Now supports the `accept_callback` argument.
- `apply_async`: Now raises `ValueError` if task args is not a list, or kwargs is not a tuple (Issue #95).
- `Task.max_retries` can now be `None`, which means it will retry forever.
- Celerybeat: Now reuses the same connection when publishing large sets of tasks.
- Modified the task locking example in the documentation to use `cache.add` for atomic locking.
- Added experimental support for a `started` status on tasks.

  If `Task.track_started` is enabled the task will report its status as “started” when the task is executed by a worker.

  The default value is `False` as the normal behaviour is to not report that level of granularity. Tasks are either pending, finished, or waiting to be retried. Having a “started” status can be useful for when there are long running tasks and there is a need to report which task is currently running.

  The global default can be overridden by the `CELERY_TRACK_STARTED` setting.


Contributions welcome!

### 9.24.3 Remote control commands

- Remote control commands can now send replies back to the caller.

  Existing commands has been improved to send replies, and the client interface in `celery.task.control` has new keyword arguments: `reply`, `timeout` and `limit`. Where reply means it will wait for replies, timeout is the time in seconds to stop waiting for replies, and limit is the maximum number of replies to get.

  By default, it will wait for as many replies as possible for one second.
- `rate_limit(task_name, destination=all, reply=False, timeout=1, limit=0)`
  Worker returns `{"ok": message}` on success, or `{"failure": message}` on failure.

```python
>>> from celery.task.control import rate_limit
>>> rate_limit("tasks.add", "10/s", reply=True)
[['worker1': {'ok': 'new rate limit set successfully'}],
 ['worker2': {'ok': 'new rate limit set successfully'}]]
```

- `ping(destination=all, reply=False, timeout=1, limit=0)`
  Worker returns the simple message “pong”.

```python
>>> from celery.task.control import ping
>>> ping(reply=True)
[['worker1': 'pong'],
 ['worker2': 'pong'],
```

- `revoke(destination=all, reply=False, timeout=1, limit=0)`
  Worker simply returns `True`.

```python
>>> from celery.task.control import revoke
>>> revoke("419e46eb-cf6a-4271-86a8-442b7124132c", reply=True)
[['worker1': True],
 ['worker2'; True]]
```

- You can now add your own remote control commands!

  Remote control commands are functions registered in the command registry. Registering a command is done using `celery.worker.control.Panel.register()`:

  ```python
  from celery.task.control import Panel

  @Panel.register
def reset_broker_connection(panel, **kwargs):
    panel.consumer.reset_connection()
    return {"ok": "connection re-established"}
  ```

  With this module imported in the worker, you can launch the command using `celery.task.control.broadcast`:

  ```python
  >>> from celery.task.control import broadcast
  >>> broadcast("reset_broker_connection", reply=True)
  [['worker1': {'ok': 'connection re-established'}],
   ['worker2': {'ok': 'connection re-established'}]]
  ```

  **TIP** You can choose the worker(s) to receive the command by using the `destination` argument:

  ```python
  >>> broadcast("reset_broker_connection", destination=['worker1'])
  [['worker1': {'ok': 'connection re-established'}]]
  ```

- New remote control command: `dump_reserved`
  Dumps tasks reserved by the worker, waiting to be executed:

  ```python
  >>> from celery.task.control import broadcast
  >>> broadcast("dump_reserved", reply=True)
  [['myworker1': [<TaskRequest ....>]]]
  ```

- New remote control command: `dump_schedule`
Dumps the workers currently registered ETA schedule. These are tasks with an \textit{eta} (or \textit{countdown}) argument waiting to be executed by the worker.

```python
>>> from celery.task.control import broadcast
>>> broadcast("dump_schedule", reply=True)
[{'w1': []},
 {'w3': []},
 {'w2': ['0. 2010-05-12 11:06:00 pri0 <TaskRequest
    name:"opalfeeds.tasks.refresh_feed_slice",
    id:"95b45760-4e73-4ce8-8eac-f100aa80273a",
    args:(<Feeds freq_max:3600 freq_min:60
          start:2184.0 stop:3276.0>,),
    kwargs:{'page': 2}>']},
 {'w4': ['0. 2010-05-12 11:00:00 pri0 <TaskRequest
    name:"opalfeeds.tasks.refresh_feed_slice",
    id:"c053480b-58fb-422f-ae68-8d30a464edfe",
    args:(<Feeds freq_max:3600 freq_min:60
          start:1092.0 stop:2184.0>,),
    kwargs:{'page': 1}>']}
'}
```

9.24.4 \textbf{Fixes}

- Mediator thread no longer blocks for more than 1 second.

  With rate limits enabled and when there was a lot of remaining time, the mediator thread could block shutdown (and potentially block other jobs from coming in).

- Remote rate limits was not properly applied (Issue #98).

- Now handles exceptions with Unicode messages correctly in \textit{TaskRequest.on_failure}.

- Database backend: \textit{TaskMeta.result}: default value should be \textit{None} not empty string.

9.25 \textbf{1.0.2}

\textbf{release-date} 2010-03-31 12:50 P.M CET

- Deprecated: \texttt{CELERY\_BACKEND}, please use \texttt{CELERY\_RESULT\_BACKEND} instead.

- We now use a custom logger in tasks. This logger supports task magic keyword arguments in formats.

  The default format for tasks (\texttt{CELERYD\_TASK\_LOG\_FORMAT}) now includes the id and the name of tasks so the origin of task log messages can easily be traced.

  \textbf{Example output}:

  \begin{verbatim}
  [2010-03-25 13:11:20.317: INFO/PoolWorker-1] [tasks.add(a6e1c5ad-60d9-42a0-8b24-9e39363125a4)] Hello from add
  \end{verbatim}

  To revert to the previous behavior you can set:
• Unit tests: Don’t disable the django test database tear down, instead fixed the underlying issue which was caused by modifications to the DATABASE_NAME setting (Issue #82).

• Django Loader: New config CELERY_DB_REUSE_MAX (max number of tasks to reuse the same database connection)

  The default is to use a new connection for every task. We would very much like to reuse the connection, but a safe number of reuses is not known, and we don’t have any way to handle the errors that might happen, which may even be database dependent.


• celeryd: The worker components are now configurable: CELERYD_POOL, CELERYD_CONSUMER, CELERYD_MEDIATOR, and CELERYD_ETA_SCHEDULER.

  The default configuration is as follows:

  CELERYD_POOL = "celery.concurrency.processes.TaskPool"
  CELERYD_MEDIATOR = "celery.worker.controllers.Mediator"
  CELERYD_ETA_SCHEDULER = "celery.worker.controllers.ScheduleController"
  CELERYD_CONSUMER = "celery.worker.consumer.Consumer"

  The CELERYD_POOL setting makes it easy to swap out the multiprocessing pool with a threaded pool, or how about a twisted/eventlet pool?

  Consider the competition for the first pool plug-in started!

• Debian init scripts: Use -a not && (Issue #82).

• Debian init scripts: Now always preserves $CELERYD_OPTS from the /etc/default/celeryd and /etc/default/celerybeat.

• celerybeat.Scheduler: Fixed a bug where the schedule was not properly flushed to disk if the schedule had not been properly initialized.

• celerybeat: Now syncs the schedule to disk when receiving the SIGTERM and SIGINT signals.

• Control commands: Make sure keywords arguments are not in Unicode.

• ETA scheduler: Was missing a logger object, so the scheduler crashed when trying to log that a task had been revoked.

• management.commands.camqadm: Fixed typo camqadm -> camqadm (Issue #83).

• PeriodicTask.delta_resolution: Was not working for days and hours, now fixed by rounding to the nearest day/hour.

• Fixed a potential infinite loop in BaseAsyncResult.__eq__, although there is no evidence that it has ever been triggered.

• celeryd: Now handles messages with encoding problems by acking them and emitting an error message.


9.26 1.0.1

  release-date 2010-02-24 07:05 P.M CET

• Tasks are now acknowledged early instead of late.
This is done because messages can only be acknowledged within the same connection channel, so if
the connection is lost we would have to refetch the message again to acknowledge it.

This might or might not affect you, but mostly those running tasks with a really long execution
time are affected, as all tasks that has made it all the way into the pool needs to be executed be-
fore the worker can safely terminate (this is at most the number of pool workers, multiplied by the
CELERYD_PREFETCH_MULTIPLIER setting.)

We multiply the prefetch count by default to increase the performance at times with bursts of tasks
with a short execution time. If this doesn’t apply to your use case, you should be able to set the
prefetch multiplier to zero, without sacrificing performance.

Note: A patch to multiprocessing is currently being worked on, this patch would enable us to
use a better solution, and is scheduled for inclusion in the 2.0.0 release.

- celeryd now shutdowns cleanly when receiving the SIGTERM signal.
- celeryd now does a cold shutdown if the SIGINT signal is received (Ctrl+C), this means it tries to terminate as
  soon as possible.
- Caching of results now moved to the base backend classes, so no need to implement this functionality in the
  base classes.
- Caches are now also limited in size, so their memory usage doesn’t grow out of control.

You can set the maximum number of results the cache can hold using the
CELERY_MAX_CACHED_RESULTS setting (the default is five thousand results). In ad-
dition, you can refetch already retrieved results using backend.reload_task_result + back-
end.reload_taskset_result (that’s for those who want to send results incrementally).

- celeryd now works on Windows again.

Warning: If you’re using Celery with Django, you can’t use project.settings as the settings
module name, but the following should work:

```
$ python manage.py celeryd --settings=settings
```

- Execution: .messaging.TaskPublisher.send_task now incorporates all the functionality apply_async previously
did.

Like converting countdowns to eta, so celery.execute.apply_async() is now simply
a convenient front-end to celery.messaging.TaskPublisher.send_task(), using the
task classes default options.

Also celery.execute.send_task() has been introduced, which can apply tasks using just
the task name (useful if the client does not have the destination task in its task registry).

Example:

```
>>> from celery.execute import send_task
>>> result = send_task("celery.ping", args=[], kwargs={})
>>> result.get()
'pong'
```

- camqadm: This is a new utility for command line access to the AMQP API.

Excellent for deleting queues/bindings/exchanges, experimentation and testing:

```
$ camqadm
1> help
```
Gives an interactive shell, type `help` for a list of commands.

When using Django, use the management command instead:

```
$ python manage.py camqadm
1> help
```

- **Redis result backend**: To conform to recent Redis API changes, the following settings has been deprecated:
  - `REDIS_TIMEOUT`
  - `REDIS_CONNECT_RETRY`

  These will emit a `DeprecationWarning` if used.

  A `REDIS_PASSWORD` setting has been added, so you can use the new simple authentication mechanism in Redis.

- The redis result backend no longer calls `SAVE` when disconnecting, as this is apparently better handled by Redis itself.
- If `settings.DEBUG` is on, celeryd now warns about the possible memory leak it can result in.
- The ETA scheduler now sleeps at most two seconds between iterations.
- The ETA scheduler now deletes any revoked tasks it might encounter.

  As revokes are not yet persistent, this is done to make sure the task is revoked even though it’s currently being hold because its eta is e.g. a week into the future.

- The `task_id` argument is now respected even if the task is executed eagerly (either using apply, or `CELERY_ALWAYS_EAGER`).
- The internal queues are now cleared if the connection is reset.
- New magic keyword argument: `delivery_info`.

  Used by retry() to resend the task to its original destination using the same exchange/routing_key.

- **Events**: Fields was not passed by `.send()` (fixes the UUID key errors in celerymon)
- Added `--schedule/-s` option to celeryd, so it is possible to specify a custom schedule filename when using an embedded celerybeat server (the `-B/-beat` option).
- Better Python 2.4 compatibility. The test suite now passes.
- **task decorators**: Now preserve docstring as `cls.__doc__`, (was previously copied to `cls.run.__doc__`)
- The `testproj` directory has been renamed to `tests` and we’re now using `nose + django-nose` for test discovery, and `unittest2` for test cases.
- New pip requirements files available in `contrib/requirements`.
- TaskPublisher: Declarations are now done once (per process).

**Added** `Task.delivery_mode` and the `CELERY_DEFAULT_DELIVERY_MODE` setting.

  These can be used to mark messages non-persistent (i.e. so they are lost if the broker is restarted).

- Now have our own `ImproperlyConfigured` exception, instead of using the Django one.
- Improvements to the Debian init scripts: Shows an error if the program is not executable. Does not modify `CELERYD` when using django with virtualenv.
9.27 1.0.0

**release-date** 2010-02-10 04:00 P.M CET

### 9.27.1 Backward incompatible changes

- Celery does not support detaching anymore, so you have to use the tools available on your platform, or something like Supervisord to make celeryd/celerybeat/celerymon into background processes.

  We’ve had too many problems with celeryd daemonizing itself, so it was decided it has to be removed. Example startup scripts has been added to `contrib/`:

  - Debian, Ubuntu, (start-stop-daemon)
    
    ```bash
    contrib/debian/init.d/celeryd contrib/debian/init.d/celerybeat
    ```

  - Mac OS X launchd
    
    ```bash
    contrib/mac/org.celeryq.celeryd.plist contrib/mac/org.celeryq.celerybeat.plist contrib/mac/org.celeryq.celerymon.plist
    ```

  - Supervisord (http://supervisord.org)
    
    ```bash
    contrib/supervisord/supervisord.conf
    ```

  In addition to `--detach`, the following program arguments has been removed: `--uid`, `--gid`, `--workdir`, `--chroot`, `--pidfile`, `--umask`. All good daemonization tools should support equivalent functionality, so don’t worry.

  Also the following configuration keys has been removed: `CELERYD_PID_FILE`, `CELERYBEAT_PID_FILE`, `CELERYMON_PID_FILE`.

- Default celeryd loglevel is now `WARN`, to enable the previous log level start celeryd with `--loglevel=INFO`.

- Tasks are automatically registered.

  This means you no longer have to register your tasks manually. You don’t have to change your old code right away, as it doesn’t matter if a task is registered twice.

  If you don’t want your task to be automatically registered you can set the `abstract` attribute

  ```python
  class MyTask(Task):
      abstract = True
  ```

  By using `abstract` only tasks subclassing this task will be automatically registered (this works like the Django ORM).

  If you don’t want subclasses to be registered either, you can set the `autoregister` attribute to `False`.

  Incidentally, this change also fixes the problems with automatic name assignment and relative imports. So you also don’t have to specify a task name anymore if you use relative imports.

- You can no longer use regular functions as tasks.

  This change was added because it makes the internals a lot more clean and simple. However, you can now turn functions into tasks by using the `@task` decorator:

  ```python
  from celery.decorators import task

  @task
  def add(x, y):
      return x + y
  ```
See also:

Tasks for more information about the task decorators.

- The periodic task system has been rewritten to a centralized solution.
  
  This means celeryd no longer schedules periodic tasks by default, but a new daemon has been introduced: celerybeat.

  To launch the periodic task scheduler you have to run celerybeat:

  $ celerybeat

  Make sure this is running on one server only, if you run it twice, all periodic tasks will also be executed twice.

  If you only have one worker server you can embed it into celeryd like this:

  $ celeryd --beat # Embed celerybeat in celeryd.

- The supervisor has been removed.
  
  This means the -S and --supervised options to celeryd is no longer supported. Please use something like http://supervisord.org instead.

- TaskSet.join has been removed, use TaskSetResult.join instead.

- The task status “DONE” has been renamed to “SUCCESS”.

-AsyncResult.is_done has been removed, use AsyncResult.successful instead.

- The worker no longer stores errors if Task.ignore_result is set, to revert to the previous behaviour set task.CELERY_STORE_ERRORS_EVEN_IF_IGNORED to True.

- The statistics functionality has been removed in favor of events, so the -S and --statistics’ switches has been removed.

- The module celery.task.strategy has been removed.

- celery.discovery has been removed, and it’s autodiscover function is now in celery.loaders.djangoapp. Reason: Internal API.

- The CELERY_LOADER environment variable now needs loader class name in addition to module name,
  E.g. where you previously had: “celery.loaders.default”, you now need “celery.loaders.default.Loader”, using the previous syntax will result in a DeprecationWarning.

- Detecting the loader is now lazy, and so is not done when importing celery.loaders.

  To make this happen celery.loaders.settings has been renamed to load_settings and is now a function returning the settings object. celery.loaders.current_loader is now also a function, returning the current loader.

  So:

  loader = current_loader

  needs to be changed to:

  loader = current_loader()

9.27.2 Deprecations

- The following configuration variables has been renamed and will be deprecated in v2.0:
• The public API names in celery.conf has also changed to a consistent naming scheme.

• We now support consuming from an arbitrary number of queues.

To do this we had to rename the configuration syntax. If you use any of the custom AMQP routing options (queue/exchange/routing_key, etc.), you should read the new FAQ entry: http://bit.ly/aiWoH.

The previous syntax is deprecated and scheduled for removal in v2.0.

• TaskSet.run has been renamed to TaskSet.apply_async.

TaskSet.run has now been deprecated, and is scheduled for removal in v2.0.

9.27.3 News

• Rate limiting support (per task type, or globally).

• New periodic task system.

• Automatic registration.

• New cool task decorator syntax.

• celeryd now sends events if enabled with the -E argument.

Excellent for monitoring tools, one is already in the making (http://github.com/ask/celerymon).

Current events include: worker-heartbeat, task-[received/succeeded/failed/retried], worker-online, worker-offline.

• You can now delete (revoke) tasks that has already been applied.

• You can now set the hostname celeryd identifies as using the --hostname argument.

• Cache backend now respects the CELERY_TASK_RESULT_EXPIRES setting.

• Message format has been standardized and now uses ISO-8601 format for dates instead of datetime.

• celeryd now responds to the SIGHUP signal by restarting itself.

• Periodic tasks are now scheduled on the clock.

  I.e. timedelta(hours=1) means every hour at :00 minutes, not every hour from the server starts. To revert to the previous behaviour you can set PeriodicTask.relative = True.

• Now supports passing execute options to a TaskSets list of args, e.g.:

  >>> ts = TaskSet(add, [[2, 2], {}, {"countdown": 1}],
      ...
      [[4, 4], {}, {"countdown": 2}],
      ...
      [[8, 8], {}, {"countdown": 3}])

  >>> ts.run()

  • Got a 3x performance gain by setting the prefetch count to four times the concurrency, (from an average task round-trip of 0.1s to 0.03s!).
A new setting has been added: `CELERYD_PREFETCH_MULTIPLIER`, which is set to 4 by default.

- Improved support for webhook tasks.
  
  `celery.task.rest` is now deprecated, replaced with the new and shiny `celery.task.http`. With more reflective names, sensible interface, and it’s possible to override the methods used to perform HTTP requests.

- The results of task sets are now cached by storing it in the result backend.

### 9.27.4 Changes

- Now depends on carrot >= 0.8.1
- New dependencies: billiard, python-dateutil, django-picklefield
- No longer depends on python-daemon
- The `uuid` distribution is added as a dependency when running Python 2.4.
- Now remembers the previously detected loader by keeping it in the `CELERY_LOADER` environment variable.

  This may help on windows where fork emulation is used.

- ETA no longer sends datetime objects, but uses ISO 8601 date format in a string for better compatibility with other platforms.
- No longer sends error mails for retried tasks.
- Task can now override the backend used to store results.
- Refactored the `ExecuteWrapper`, `apply` and `CELERY_ALWAYS_EAGER` now also executes the task callbacks and signals.
- Now using a proper scheduler for the tasks with an ETA.

  This means waiting eta tasks are sorted by time, so we don’t have to poll the whole list all the time.

- Now also imports modules listed in `CELERY_IMPORTS` when running with django (as documented).
- Log level for stdout/stderr changed from INFO to ERROR
- ImportErrors are now properly propagated when autodiscovering tasks.
- You can now use `celery.messaging.establish_connection` to establish a connection to the broker.
- When running as a separate service the periodic task scheduler does some smart moves to not poll too regularly.

  If you need faster poll times you can lower the value of `CELERYBEAT_MAX_LOOP_INTERVAL`.

- You can now change periodic task intervals at runtime, by making `run_every` a property, or subclassing `PeriodicTask.is_due`.
- The worker now supports control commands enabled through the use of a broadcast queue, you can remotely revoke tasks or set the rate limit for a task type. See `celery.task.control`.
- The services now sets informative process names (as shown in `ps` listings) if the `setproctitle` module is installed.
- `celery.exceptions.NotRegistered` now inherits from `KeyError`, and `TaskRegistry.__getitem__`’ “pop” raises `NotRegistered` instead
- You can set the loader via the `CELERY_LOADER` environment variable.
- You can now set `CELERY_IGNORE_RESULT` to ignore task results by default (if enabled, tasks doesn’t save results or errors to the backend used).
• celeryd now correctly handles malformed messages by throwing away and acknowledging the message, instead of crashing.

9.27.5 Bugs

• Fixed a race condition that could happen while storing task results in the database.

9.27.6 Documentation

• Reference now split into two sections; API reference and internal module reference.

9.28 0.8.4

release-date 2010-02-05 01:52 P.M CEST

• Now emits a warning if the –detach argument is used. –detach should not be used anymore, as it has several not easily fixed bugs related to it. Instead, use something like start-stop-daemon, Supervisord or launchd (os x).

• Make sure logger class is process aware, even if running Python >= 2.6.

• Error e-mails are not sent anymore when the task is retried.

9.29 0.8.3

release-date 2009-12-22 09:43 A.M CEST

• Fixed a possible race condition that could happen when storing/querying task results using the database backend.

• Now has console script entry points in the setup.py file, so tools like Buildout will correctly install the programs celeryd and celeryinit.

9.30 0.8.2

release-date 2009-11-20 03:40 P.M CEST

• QOS Prefetch count was not applied properly, as it was set for every message received (which apparently behaves like, “receive one more”), instead of only set when our wanted value changed.

9.31 0.8.1

release-date 2009-11-16 05:21 P.M CEST

9.31.1 Very important note

This release (with carrot 0.8.0) enables AMQP QoS (quality of service), which means the workers will only receive as many messages as it can handle at a time. As with any release, you should test this version upgrade on your development servers before rolling it out to production!
9.31.2 Important changes

- If you’re using Python < 2.6 and you use the multiprocessing backport, then multiprocessing version 2.6.2.1 is required.
- All AMQP_* settings has been renamed to BROKER_*, and in addition AMQP_SERVER has been renamed to BROKER_HOST, so before where you had:

  AMQP_SERVER = "localhost"
  AMQP_PORT = 5678
  AMQP_USER = "myuser"
  AMQP_PASSWORD = "mypassword"
  AMQP_VHOST = "celery"

  You need to change that to:

  BROKER_HOST = "localhost"
  BROKER_PORT = 5678
  BROKER_USER = "myuser"
  BROKER_PASSWORD = "mypassword"
  BROKER_VHOST = "celery"

- Custom carrot backends now need to include the backend class name, so before where you had:

  CARROT_BACKEND = "mycustom.backend.module"

  you need to change it to:

  CARROT_BACKEND = "mycustom.backend.module.Backend"

  where Backend is the class name. This is probably “Backend”, as that was the previously implied name.
- New version requirement for carrot: 0.8.0

9.31.3 Changes

- Incorporated the multiprocessing backport patch that fixes the processName error.
- Ignore the result of PeriodicTask’s by default.
- Added a Redis result store backend
- Allow /etc/default/celeryd to define additional options for the celeryd init script.
- MongoDB periodic tasks issue when using different time than UTC fixed.
- Windows specific: Negate test for available os.fork (thanks miracle2k)
- Now tried to handle broken PID files.
- Added a Django test runner to contrib that sets CELERY_ALWAYS_EAGER = True for testing with the database backend.
- Added a CELERY_CACHE_BACKEND setting for using something other than the django-global cache backend.
- Use custom implementation of functools.partial (curry) for Python 2.4 support (Probably still problems with running on 2.4, but it will eventually be supported)
- Prepare exception to pickle when saving RETRY status for all backends.
- SQLite no concurrency limit should only be effective if the database backend is used.
9.32 0.8.0

release-date  2009-09-22 03:06 P.M CEST

9.32.1 Backward incompatible changes

• Add traceback to result value on failure.
  
  **Note:** If you use the database backend you have to re-create the database table `celery_taskmeta`. Contact the Mailing list or IRC channel for help doing this.

• Database tables are now only created if the database backend is used, so if you change back to the database backend at some point, be sure to initialize tables (django: `syncdb`, python: `celeryinit`).
  
  **Note:** This is only applies if using Django version 1.1 or higher.

• Now depends on `carrot` version 0.6.0.
• Now depends on python-daemon 1.4.8

9.32.2 Important changes

• Celery can now be used in pure Python (outside of a Django project).
  This means celery is no longer Django specific.
  For more information see the FAQ entry *Is Celery for Django only?*

• Celery now supports task retries.
  See Cookbook: Retrying Tasks for more information.

• We now have an AMQP result store backend.
  It uses messages to publish task return value and status. And it’s incredibly fast!
  See issue #6 for more info!

• AMQP QoS (prefetch count) implemented:
  This to not receive more messages than we can handle.

• Now redirects stdout/stderr to the celeryd log file when detached

• **Now uses inspect.getargspec to only pass default arguments** the task supports.

• Add Task.on_success, .on_retry, .on_failure handlers
  See `celery.task.base.Task.on_success()`, `celery.task.base.Task.on_retry()`, `celery.task.base.Task.on_failure()`,

• `celery.utils.gen_unique_id`: Workaround for [http://bugs.python.org/issue4607](http://bugs.python.org/issue4607)

• You can now customize what happens at worker start, at process init, etc., by creating your own loaders.
  (see `celery.loaders.default`, `celery.loaders.djangoapp`, `celery.loaders`)

• Support for multiple AMQP exchanges and queues.
  This feature misses documentation and tests, so anyone interested is encouraged to improve this situation.
• celeryd now survives a restart of the AMQP server!
  Automatically re-establish AMQP broker connection if it’s lost.

New settings:
  – AMQP_CONNECTION_RETRY Set to True to enable connection retries.
  – AMQP_CONNECTION_MAX_RETRIES. Maximum number of restarts before we give up. Default: 100.

9.32.3 News

• Fix an incompatibility between python-daemon and multiprocessing, which resulted in the [Errno 10] No child processes problem when detaching.

• Fixed a possible DjangoUnicodeDecodeError being raised when saving pickled data to Django’s memcached cache backend.

• Better Windows compatibility.

• New version of the pickled field (taken from http://www.djangosnippets.org/snippets/513/)

• New signals introduced: task_sent, task_prerun and task_postrun, see celery.signals for more information.

• TaskSetResult.join caused TypeError when timeout=None. Thanks Jerzy Kozera. Closes #31

• views.apply should return HttpResponse instance. Thanks to Jerzy Kozera. Closes #32

• PeriodicTask: Save conversion of run_every from int to timedelta to the class attribute instead of on the instance.

• Exceptions has been moved to celery.exceptions, but are still available in the previous module.

• Try to rollback transaction and retry saving result if an error happens while setting task status with the database backend.

• jail() refactored into celery.execute.ExecuteWrapper.

• views.apply now correctly sets mime-type to “application/json”

• views.task_status now returns exception if state is RETRY

• views.task_status now returns traceback if state is FAILURE or RETRY

• Documented default task arguments.

• Add a sensible __repr__ to ExceptionInfo for easier debugging

• Fix documentation typo .. import map -> .. import dmap. Thanks to mikedizon

9.33 0.6.0

release-date 2009-08-07 06:54 A.M CET

9.33.1 Important changes

• Fixed a bug where tasks raising unpickleable exceptions crashed pool workers. So if you’ve had pool workers mysteriously disappearing, or problems with celeryd stopping working, this has been fixed in this version.
• Fixed a race condition with periodic tasks.
• **The task pool is now supervised, so if a pool worker crashes**, goes away or stops responding, it is automatically replaced with a new one.
• **Task.name is now automatically generated out of class module+name, e.g.**
  
  “django_twitter.tasks.UpdateStatusesTask”. Very convenient. No idea why we didn’t do this before. Some documentation is updated to not manually specify a task name.

### 9.33.2 News

• Tested with Django 1.1
• New Tutorial: Creating a click counter using carrot and celery
• **Database entries for periodic tasks are now created at celeryd** startup instead of for each check (which has been a forgotten TODO/XXX in the code for a long time)
• **New settings variable:** `CELERY_TASK_RESULT_EXPIRES` Time (in seconds, or a `datetime.timedelta` object) for when after stored task results are deleted. For the moment this only works for the database backend.
• `celeryd` now emits a debug log message for which periodic tasks has been launched.
• **The periodic task table is now locked for reading while getting** periodic task status. (MySQL only so far, seeking patches for other engines)
• A lot more debugging information is now available by turning on the `DEBUG` log level (`--loglevel=DEBUG`).
• Functions/methods with a timeout argument now works correctly.
• **New: celery.strategy.even_time_distribution:** With an iterator yielding task args, kwargs tuples, evenly distribute the processing of its tasks throughout the time window available.
• Log message *Unknown task ignored...* now has log level `ERROR`
• Log message “*Got task from broker*” is now emitted for all tasks, even if the task has an ETA (estimated time of arrival). Also the message now includes the ETA for the task (if any).
• **Acknowledgement now happens in the pool callback. Can’t do ack in the job** target, as it’s not pickleable (can’t share AMQP connection, etc.).
• Added note about `.delay` hanging in README
• Tests now passing in Django 1.1
• Fixed discovery to make sure app is in `INSTALLED_APPS`
• **Previously overridden pool behavior** (process reap, wait until pool worker available, etc.) is now handled by `multiprocessing.Pool` itself.
• Convert statistics data to Unicode for use as kwargs. Thanks Lucy!

### 9.34 0.4.1

• **release-date** 2009-07-02 01:42 P.M CET
• Fixed a bug with parsing the message options (`mandatory`, `routing_key`, `priority`, `immediate`)
9.35 0.4.0

release-date 2009-07-01 07:29 P.M CET

- Adds eager execution. `celery.execute.apply`/`Task.apply` executes the function blocking until the task is done, for API compatibility it returns an `celery.result.EagerResult` instance. You can configure celery to always run tasks locally by setting the `CELERY_ALWAYS_EAGER` setting to `True`.

- Now depends on `anyjson`.
- 99% coverage using python `coverage` 3.0.

9.36 0.3.20

release-date 2009-06-25 08:42 P.M CET

- New arguments to `apply_async` (the advanced version of `delay_task`), `countdown` and `eta`;

```python
>>> # Run 10 seconds into the future.
>>> res = apply_async(MyTask, countdown=10);

>>> # Run 1 day from now
>>> res = apply_async(MyTask,
...                   eta=datetime.now() + timedelta(days=1))
```

- Now unlinks stale PID files
- Lots of more tests.
- Now compatible with carrot >= 0.5.0.
- IMPORTANT The `subtask_ids` attribute on the `TaskSetResult` instance has been removed. To get this information instead use:

```python
>>> subtask_ids = [subtask.task_id for subtask in ts_res.subtasks]
```

- `Taskset.run()` now respects extra message options from the task class.
- Task: Add attribute `ignore_result`: Don’t store the status and return value. This means you can’t use the `celery.result.AsyncResult` to check if the task is done, or get its return value. Only use if you need the performance and is able live without these features. Any exceptions raised will store the return value/status as usual.
- Task: Add attribute `disable_error_emails` to disable sending error emails for that task.
- Should now work on Windows (although running in the background won’t work, so using the `--detach` argument results in an exception being raised.)
- Added support for statistics for profiling and monitoring. To start sending statistics start celeryd with the `--statistics` option. Then after a while you can dump the results by running `python manage.py celerystats`. See celery.monitoring for more information.
- The celery daemon can now be supervised (i.e. it is automatically restarted if it crashes). To use this start celeryd with the `--supervised` option (or alternatively `-S`).
- views.apply: View applying a task. Example

http://e.com/celery/apply/task_name/arg1/arg2/?kwarg1=a&kwarg2=b

Warning: Use with caution! Do not expose this URL to the public without first ensuring that your code is safe!
• Refactored celery.task. It’s now split into three modules:
  – celery.task
    Contains apply_async, delay_task, discard_all, and task shortcuts, plus imports objects from celery.task.base and celery.task.builtins
  – celery.task.base
    Contains task base classes: Task, PeriodicTask, TaskSet, AsynchronousMapTask, ExecuteRemoteTask.
  – celery.task.builtins
    Built-in tasks: PingTask, DeleteExpiredTaskMetaTask.

9.37 0.3.7

release-date 2008-06-16 11:41 P.M CET

• IMPORTANT Now uses AMQP’s basic.consume instead of basic.get. This means we’re no longer polling the broker for new messages.
• IMPORTANT Default concurrency limit is now set to the number of CPUs available on the system.
• IMPORTANT tasks.register: Renamed task_name argument to name, so

>>> tasks.register(func, task_name="mytask")

has to be replaced with:

>>> tasks.register(func, name="mytask")

• The daemon now correctly runs if the pidlock is stale.
• Now compatible with carrot 0.4.5
• Default AMQP connection timeout is now 4 seconds.
• AsyncResult.read() was always returning True.
• Only use README as long_description if the file exists so easy_install doesn’t break.
• celery.view: JSON responses now properly set its mime-type.
• apply_async now has a connection keyword argument so you can re-use the same AMQP connection if you want to execute more than one task.
• Handle failures in task_status view such that it won’t throw 500s.
• Fixed typo AMQP_SERVER in documentation to AMQP_HOST.
• Worker exception e-mails sent to administrators now works properly.
• No longer depends on django, so installing celery won’t affect the preferred Django version installed.
• Now works with PostgreSQL (psycopg2) again by registering the PickledObject field.
• celeryd: Added --detach option as an alias to --daemon, and it’s the term used in the documentation from now on.
• Make sure the pool and periodic task worker thread is terminated properly at exit. (So Ctrl-C works again).
• Now depends on python-daemon.
• Removed dependency to simplejson

• Cache Backend: Re-establishes connection for every task process if the Django cache backend is memcached/libmemcached.

• Tyrant Backend: Now re-establishes the connection for every task executed.

9.38 0.3.3

release-date 2009-06-08 01:07 P.M CET

• The PeriodicWorkController now sleeps for 1 second between checking for periodic tasks to execute.

9.39 0.3.2

release-date 2009-06-08 01:07 P.M CET

• celeryd: Added option –discard: Discard (delete!) all waiting messages in the queue.

• celeryd: The –wakeup-after option was not handled as a float.

9.40 0.3.1

release-date 2009-06-08 01:07 P.M CET

• The PeriodicTask worker is now running in its own thread instead of blocking the TaskController loop.

• Default QUEUE_WAKEUP_AFTER has been lowered to 0.1 (was 0.3)

9.41 0.3.0

release-date 2009-06-08 12:41 P.M CET

**Warning:** This is a development version, for the stable release, please see versions 0.2.x.

**VERY IMPORTANT:** Pickle is now the encoder used for serializing task arguments, so be sure to flush your task queue before you upgrade.

• **IMPORTANT** TaskSet.run() now returns a celery.result.TaskSetResult instance, which lets you inspect the status and return values of a taskset as it was a single entity.

• **IMPORTANT** Celery now depends on carrot >= 0.4.1.

• The celery daemon now sends task errors to the registered admin e-mails. To turn off this feature, set SENDCELERY_TASK_ERROR_EMAILS to False in your settings.py. Thanks to Grégoire Cachet.

• You can now run the celery daemon by using manage.py:

  $ python manage.py celeryd

  Thanks to Grégoire Cachet.
• Added support for message priorities, topic exchanges, custom routing keys for tasks. This means we have introduced `celery.task.apply_async`, a new way of executing tasks.

You can use `celery.task.delay` and `celery.Task.delay` like usual, but if you want greater control over the message sent, you want `celery.task.apply_async` and `celery.Task.apply_async`.

This also means the AMQP configuration has changed. Some settings has been renamed, while others are new:

```python
CELERY_AMQP_EXCHANGE
CELERY_AMQP_PUBLISHER_ROUTING_KEY
CELERY_AMQP_CONSUMER_ROUTING_KEY
CELERY_AMQP_CONSUMER_QUEUE
CELERY_AMQP_EXCHANGE_TYPE
```

See the entry Can I send some tasks to only some servers? in the FAQ for more information.

• Task errors are now logged using log level `ERROR` instead of `INFO`, and stacktraces are dumped. Thanks to Grégoire Cachet.

• Make every new worker process re-establish it’s Django DB connection, this solving the “MySQL connection died?” exceptions. Thanks to Vitaly Babiy and Jirka Vejrazka.

• **IMPORTANT** Now using pickle to encode task arguments. This means you now can pass complex python objects to tasks as arguments.

• Removed dependency to `yadayada`.

• Added a FAQ, see `docs/faq.rst`.

• Now converts any Unicode keys in task `kwargs` to regular strings. Thanks Vitaly Babiy.

• Renamed the `TaskDaemon` to `WorkController`.

• `celery.datastructures.TaskProcessQueue` is now renamed to `celery.pool.TaskPool`.

• The pool algorithm has been refactored for greater performance and stability.

### 9.42 0.2.0

**release-date** 2009-05-20 05:14 P.M CET

• Final release of 0.2.0

• Compatible with carrot version 0.4.0.

• Fixes some syntax errors related to fetching results from the database backend.

### 9.43 0.2.0-pre3

**release-date** 2009-05-20 05:14 P.M CET

• *Internal release.* Improved handling of unpickleable exceptions. `get_result` now tries to recreate something looking like the original exception.

### 9.44 0.2.0-pre2

**release-date** 2009-05-20 01:56 P.M CET
• Now handles unpickleable exceptions (like the dynamically generated subclasses of
django.core.exception.MultipleObjectsReturned).

9.45 0.2.0-pre1

release-date 2009-05-20 12:33 P.M CET

• It’s getting quite stable, with a lot of new features, so bump version to 0.2. This is a pre-release.

• celery.task.mark_as_read() and celery.task.mark_as_failure() has been removed. Use celery.backends.default_backend.mark_as_read(), and celery.backends.default_backend.mark_as_failure() instead.

9.46 0.1.15

release-date 2009-05-19 04:13 P.M CET

• The celery daemon was leaking AMQP connections, this should be fixed, if you have any problems with too many files open (like emfile errors in rabbit.log, please contact us!)

9.47 0.1.14

release-date 2009-05-19 01:08 P.M CET

• Fixed a syntax error in the TaskSet class. (No such variable TimeOutError).

9.48 0.1.13

release-date 2009-05-19 12:36 P.M CET

• Forgot to add yadayada to install requirements.

• Now deletes all expired task results, not just those marked as done.

• Able to load the Tokyo Tyrant backend class without django configuration, can specify tyrant settings directly in the class constructor.

• Improved API documentation

• Now using the Sphinx documentation system, you can build the html documentation by doing

  $ cd docs
  $ make html

  and the result will be in docs/build/html.

9.49 0.1.12

release-date 2009-05-18 04:38 P.M CET
• `delay_task()` etc. now returns `celery.taskAsyncResult` object, which lets you check the result and any failure that might have happened. It kind of works like the `multiprocessingAsyncResult` class returned by `multiprocessing.Pool.map_async`.

• Added `dmap()` and `dmap_async()`. This works like the `multiprocessing.Pool` versions except they are tasks distributed to the celery server. Example:

```python
>>> from celery.task import dmap
>>> import operator
>>> dmap(operator.add, [[2, 2], [4, 4], [8, 8]])
[4, 8, 16]

>>> from celery.task import dmap_async
>>> import operator
>>> result = dmap_async(operator.add, [[2, 2], [4, 4], [8, 8]])
>>> result.ready()
False
>>> time.sleep(1)
>>> result.ready()
True
>>> result.result
[4, 8, 16]
```

• Refactored the task metadata cache and database backends, and added a new backend for Tokyo Tyrant. You can set the backend in your django settings file. E.g.:

```python
CELERY_RESULT_BACKEND = "database"; # Uses the database
CELERY_RESULT_BACKEND = "cache"; # Uses the django cache framework
CELERY_RESULT_BACKEND = "tyrant"; # Uses Tokyo Tyrant
TT_HOST = "localhost"; # Hostname for the Tokyo Tyrant server.
TT_PORT = 6657; # Port of the Tokyo Tyrant server.
```

9.50 0.1.11

**release-date** 2009-05-12 02:08 P.M CET

• The logging system was leaking file descriptors, resulting in servers stopping with the EMFILES (too many open files) error. (fixed)

9.51 0.1.10

**release-date** 2009-05-11 12:46 P.M CET

• Tasks now supports both positional arguments and keyword arguments.

• Requires carrot 0.3.8.

• The daemon now tries to reconnect if the connection is lost.

9.52 0.1.8

**release-date** 2009-05-07 12:27 P.M CET

• Better test coverage
• More documentation
• cELeryd doesn’t emit Queue is empty message if settings.CELERYD_EMPTY_MSG_EMIT_EVERY is 0.

9.53  0.1.7

release-date  2009-04-30 01:50 P.M CET

• Added some unit tests
• Can now use the database for task metadata (like if the task has been executed or not). Set settings.CELERY_TASK_META
• Can now run python setup.py test to run the unit tests from within the tests project.
• Can set the AMQP exchange/routing key/queue using settings.CELERY_AMQP_EXCHANGE, settings.CELERY_AMQP_ROUTING_KEY, and settings.CELERY_AMQP_CONSUMER_QUEUE.

9.54  0.1.6

release-date  2009-04-28 02:13 P.M CET

• Introducing TaskSet. A set of subtasks is executed and you can find out how many, or if all them, are done (excellent for progress bars and such)
• Now catches all exceptions when running Task.__call__, so the daemon doesn’t die. This doesn’t happen for pure functions yet, only Task classes.
• autodiscover() now works with zipped eggs.
• cELeryd: Now adds current working directory to sys.path for convenience.
• The run_every attribute of PeriodicTask classes can now be a datetime.timedelta() object.
• cELeryd: You can now set the DJANGO_PROJECT_DIR variable for cELeryd and it will add that to sys.path for easy launching.
• Can now check if a task has been executed or not via HTTP.
• You can do this by including the cELery urls.py into your project,

>>> url(r'^celery/$', include("celery.urls"))

then visiting the following url:

http://mysite/celery/$task_id/done/

this will return a JSON dictionary like e.g:

>>> {"task": {"id": $task_id, "executed": true}}

• delay_task now returns string id, not uuid.UUID instance.
• Now has PeriodicTasks, to have cron like functionality.
• Project changed name from crunchy to cELery. The details of the name change request is in docs/name_change_request.txt.
9.55 0.1.0

**release-date**  2009-04-24 11:28 A.M CET
- Initial release
10.1 celery.app

Celery Application.

Parameters

- **main** – Name of the main module if running as `__main__`.
- **loader** – The loader class, or the name of the loader class to use. Default is `celery.loaders.app.AppLoader`.
- **backend** – The result store backend class, or the name of the backend class to use. Default is the value of the `CELERY_RESULT_BACKEND` setting.
- **amqp** – AMQP object or class name.
- **events** – Events object or class name.
- **log** – Log object or class name.
- **control** – Control object or class name.
- **set_as_current** – Make this the global current app.
main
Name of the __main__ module. Required for standalone scripts.
If set this will be used instead of __main__ when automatically generating task names.

amqp
Sending/receiving messages. See AMQP.

backend
Storing/retrieving task state. See BaseBackend.

loader
Current loader.

conf
Current configuration (dict and attribute access).

ccontrol
Controlling worker nodes. See Control.

log
Logging utilities. See Logging.

config_from_object(arg, silent=False)
Read configuration from object, where object is either a real object, or the name of an object to import.

>>> celery.config_from_object("myapp.celeryconfig")

>>> from myapp import celeryconfig
>>> celery.config_from_object(celeryconfig)

config_from_envvar(variable_name, silent=False)
Read configuration from environment variable.
The value of the environment variable must be the name of an object to import.

>>> os.environ["CELERY_CONFIG_MODULE"] = "myapp.celeryconfig"
>>> celery.config_from_envvar("CELERY_CONFIG_MODULE")

config_from_cmdline(argv, namespace='celery')
Read configuration from argv.

The config

@task(*args, **options)
Decorator to create a task class out of any callable.

Examples
@task()
def refresh_feed(url):
    return Feed.objects.get(url=url).refresh()

With setting extra options and using retry.

@task(exchange="feeds")
def refresh_feed(url, **kwargs):
    try:
        return Feed.objects.get(url=url).refresh()
    except socket.error, exc:
        refresh_feed.retry(args=[url], kwargs=kwargs, exc=exc)

Calling the resulting task:
create_task_cls()
    Creates a base task class using default configuration taken from this app.

TaskSet(*args, **kwargs)
    Create new TaskSet.

send_task(name, args=None, kwargs=None, countdown=None, eta=None, task_id=None, publisher=None, connection=None, connect_timeout=None, result_cls=None, expires=None, queues=None, **options)
    Send task by name.

        Parameters

    • name – Name of task to execute (e.g. “tasks.add”).
    • result_cls – Specify custom result class. Default is using AsyncResult().

        Supports the same arguments as apply_async().

AsyncResult(task_id, backend=None, task_name=None)
    Create celery.result.BaseAsyncResult instance.

TaskSetResult(taskset_id, results, **kwargs)
    Create celery.result.TaskSetResult instance.

worker_main(argv=None)
    Run celeryd using argv. Uses sys.argv if argv is not specified.

Worker(**kwargs)
    Create new Worker instance.

Beat(**kwargs)
    Create new Beat instance.

broker_connection(hostname=None, userid=None, password=None, virtual_host=None, port=None, ssl=None, insist=None, connect_timeout=None, transport=None, **kwargs)
    Establish a connection to the message broker.

        Parameters

    • hostname – defaults to the BROKER_HOST setting.
    • userid – defaults to the BROKER_USER setting.
    • password – defaults to the BROKER_PASSWORD setting.
    • virtual_host – defaults to the BROKER_VHOST setting.
    • port – defaults to the BROKER_PORT setting.
    • ssl – defaults to the BROKER_USE_SSL setting.
    • insist – defaults to the BROKER_INSIST setting.
    • connect_timeout – defaults to the BROKER_CONNECTION_TIMEOUT setting.
    • backend_cls – defaults to the BROKER_BACKEND setting.

:returns kombu.connection.BrokerConnection:
with_default_connection(func)
With any function accepting connection and connect_timeout keyword arguments, establishes a default connection if one is not already passed to it.

Any automatically established connection will be closed after the function returns.

mail_admins(subject, body, fail_silently=False)
Send an e-mail to the admins in the ADMINS setting.

prepare_config(c)
Prepare configuration before it is merged with the defaults.

either(default_key, *values)
Fallback to the value of a configuration key if none of the *values are true.

merge(l, r)
Like dict(a, **b) except it will keep values from a if the value in b is None.

10.1.2 Functions

celery.app.app_or_default(app=None)
Returns the app provided or the default app if none.

The environment variable CELERY_TRACE_APP is used to trace app leaks. When enabled an exception is raised if there is no active app.

10.2 celery.app.amqp

AMQ related functionality.

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10.2.1 AMQP

class celery.app.amqp.AMQP(app)

BrokerConnection
Broker connection class used. Default is kombu.connection.BrokerConnection.

Consumer
The task consumer class used. Default is kombu.compat.Consumer.

ConsumerSet
The class used to consume from multiple queues using the same channel.

queues
All currently defined task queues. (A Queue instance).
**Queues** *(queues)*
Create new `Queues` instance, using queue defaults from the current configuration.

**Router** *(queues=None, create_missing=None)*
Returns the current task router.

**TaskConsumer** *(*args, **kwargs)*
Returns consumer for a single task queue.

**TaskPublisher** *(*args, **kwargs)*
Returns publisher used to send tasks.

You should use `app.send_task` instead.

**get_task_consumer** *(connection, queues=None, **kwargs)*
Return consumer configured to consume from all known task queues.

**get_default_queue** *
Returns `(queue_name, queue_options)` tuple for the queue configured to be default *(CELERY_DEFAULT_QUEUE)*.

### 10.2.2 Queues

```python
class celery.app.amqp.Queues (queues)
```

Queue name declaration mapping.

Celery will consult this mapping to find the options for any queue by name.

**Parameters**

- `queues` – Initial mapping.

**add** *(queue, exchange=None, routing_key=None, exchange_type='direct', **options)*
Add new queue.

**Parameters**

- `queue` – Name of the queue.
- `exchange` – Name of the exchange.
- `routing_key` – Binding key.
- `exchange_type` – Type of exchange.
- `**options` – Additional declaration options.

**options** *(exchange, routing_key, exchange_type='direct', **options)*
Creates new option mapping for queue, with required keys present.

**format** *(indent=0, indent_first=True)*
Format routing table into string for log dumps.

**select_subset** *(wanted, create_missing=True)*
Select subset of the currently defined queues.

Does not return anything: queues not in `wanted` will be discarded in-place.

**Parameters**

- `wanted` – List of wanted queue names.
- `create_missing` – By default any unknown queues will be added automatically, but if disabled the occurrence of unknown queues in `wanted` will raise `KeyError`.
classmethod `with_defaults`(queues, default_exchange, default_exchange_type)

Alternate constructor that adds default exchange and exchange type information to queues that does not have any.

### 10.2.3 TaskPublisher

```python
class celery.app.amqp.TaskPublisher(*args, **kwargs)
```

- `auto_declare = True`
- `declare()`
- `delay_task(task_name, task_args=None, task_kwags=None, countdown=None, eta=None, task_id=None, taskset_id=None, expires=None, exchange=None, exchange_type=None, event_dispatcher=None, retry=None, retry_policy=None, queue=None, now=None, retries=0, **kwargs)`
  - Send task message.
  - `retry = False`
  - `retry_policy = None`

### 10.3 celery.app.defaults

```python
class celery.app.defaults.Option(default=None, *args, **kwargs)
```

- `to_python(value)`
  - `typemap = {'bool': <function str_to_bool at 0x1d9f2a8>, 'string': <type 'str'>, 'tuple': <type 'tuple'>, 'int': <type 'int'>, 'dict': <type 'dict'>, 'float': <type 'float'>, 'any': <function <lambda> at 0x1d9f398>}`
  - `celery.app.defaults.str_to_bool(term, table={'false': False, 'no': False, '1': True, '0': False, 'yes': True, 'true': True})`

### 10.4 celery.task

```python
celery.task.task(*args, **kwargs)
```

Decorator to create a task class out of any callable.

**Examples**

```python
@task()
def refresh_feed(url):
    return Feed.objects.get(url=url).refresh()
```

With setting extra options and using retry.

```python
@task(max_retries=10)
def refresh_feed(url):
    try:
        return Feed.objects.get(url=url).refresh()
    except socket.error, exc:
        refresh_feed.retry(exc=exc)
```

Calling the resulting task:
>>> refresh_feed("http://example.com/rss")  # Regular
<Feed: http://example.com/rss>
>>> refresh_feed.delay("http://example.com/rss")  # Async
<AsyncResult: 8998d0f4-da0b-4669-ba03-d5ab5ac6ad5d>

celery.task.periodic_task(*args, **options)
Decorator to create a task class out of any callable.

Examples
@task()
def refresh_feed(url):
    return Feed.objects.get(url=url).refresh()

With setting extra options and using retry.
@task(exchange="feeds")
def refresh_feed(url, **kwargs):
    try:
        return Feed.objects.get(url=url).refresh()
    except socket.error, exc:
        refresh_feed.retry(args=[url], kwargs=kwargs, exc=exc)

Calling the resulting task:
>>> refresh_feed("http://example.com/rss")  # Regular
<Feed: http://example.com/rss>
>>> refresh_feed.delay("http://example.com/rss")  # Async
<AsyncResult: 8998d0f4-da0b-4669-ba03-d5ab5ac6ad5d>

celery.task.Task
Task base class.
When called tasks apply the run() method. This method must be defined by all tasks (that is unless the __call__() method is overridden).

See also:
celery.task.base.BaseTask.

10.5 celery.task.base

celery.task.base.BaseTask
Task base class.
When called tasks apply the run() method. This method must be defined by all tasks (that is unless the __call__() method is overridden).

classmethod AsyncResult(task_id)
Get AsyncResult instance for this kind of task.

Parameters task_id – Task id to get result for.

exception MaxRetriesExceededError
The tasks max restart limit has been exceeded.

BaseTask.abstract = None
If True the task is an abstract base class.
**BaseTask**. `accept_magic_kwargs = False`
If disabled the worker will not forward magic keyword arguments. Deprecated and scheduled for removal in v3.0.

**BaseTask**. `acks_late = False`
When enabled messages for this task will be acknowledged after the task has been executed, and not just before which is the default behavior.

Please note that this means the task may be executed twice if the worker crashes mid execution (which may be acceptable for some applications).

The application default can be overridden with the `CELERY_ACKS_LATE` setting.

**BaseTask**. `after_return` *(status, retval, task_id, args, kwargs, einfo=None)*
Handler called after the task returns.

**Parameters**

- **status** – Current task state.
- **retval** – Task return value/exception.
- **task_id** – Unique id of the task.
- **args** – Original arguments for the task that failed.
- **kwargs** – Original keyword arguments for the task that failed.
- **einfo** – `ExceptionInfo` instance, containing the traceback (if any).

The return value of this handler is ignored.

**BaseTask**. `app = None`
The application instance associated with this task class.

**classmethod BaseTask**. `apply` *(args=None, kwargs=None, **options)*
Execute this task locally, by blocking until the task returns.

**Parameters**

- **args** – positional arguments passed on to the task.
- **kwargs** – keyword arguments passed on to the task.
- **throw** – Re-raise task exceptions. Defaults to the `CELERY_EAGER_PROPAGATES_EXCEPTIONS` setting.

:rtype: `celery.result.EagerResult`

**classmethod BaseTask**. `apply_async` *(args=None, kwargs=None, countdown=None, eta=None, task_id=None, publisher=None, connection=None, connect_timeout=None, router=None, expires=None, queues=None, **options)*
Apply tasks asynchronously by sending a message.

**Parameters**

- **args** – The positional arguments to pass on to the task (a list or tuple).
- **kwargs** – The keyword arguments to pass on to the task (a dict)
- **countdown** – Number of seconds into the future that the task should execute. Defaults to immediate delivery (do not confuse with the `immediate` flag, as they are unrelated).
- **eta** – A `datetime` object describing the absolute time and date of when the task should be executed. May not be specified if `countdown` is also supplied. (Do not confuse this with the `immediate` flag, as they are unrelated).
• **expires** – Either an *int*, describing the number of seconds, or a *datetime* object that describes the absolute time and date of when the task should expire. The task will not be executed after the expiration time.

• **connection** – Re-use existing broker connection instead of establishing a new one. The `connect_timeout` argument is not respected if this is set.

• **connect_timeout** – The timeout in seconds, before we give up on establishing a connection to the AMQP server.

• **retry** – If enabled sending of the task message will be retried in the event of connection loss or failure. Default is taken from the `CELERY_TASK_PUBLISH_RETRY` setting. Note you need to handle the publisher/connection manually for this to work.

• **retry_policy** – Override the retry policy used. See the `CELERY_TASK_PUBLISH_RETRY` setting.

• **routing_key** – The routing key used to route the task to a worker server. Defaults to the `routing_key` attribute.

• **exchange** – The named exchange to send the task to. Defaults to the `exchange` attribute.

• **exchange_type** – The exchange type to initialize the exchange if not already declared. Defaults to the `exchange_type` attribute.

• **immediate** – Request immediate delivery. Will raise an exception if the task cannot be routed to a worker immediately. (Do not confuse this parameter with the `countdown` and `eta` settings, as they are unrelated). Defaults to the `immediate` attribute.

• **mandatory** – Mandatory routing. Raises an exception if there’s no running workers able to take on this task. Defaults to the `mandatory` attribute.

• **priority** – The task priority, a number between 0 and 9. Defaults to the `priority` attribute.

• **serializer** – A string identifying the default serialization method to use. Can be `pickle`, `json`, `yaml`, `msgpack` or any custom serialization method that has been registered with `kombu.serialization.registry`. Defaults to the `serializer` attribute.

• **compression** – A string identifying the compression method to use. Can be one of `zlib`, `bzip2`, or any custom compression methods registered with `kombu.compression.register()`. Defaults to the `CELERY_MESSAGE_COMPRESSION` setting.

**Note:** If the `CELERY_ALWAYS_EAGER` setting is set, it will be replaced by a local `apply()` call instead.

**BaseTask.autoregister = True**
If disabled this task won’t be registered automatically.

**BaseTask.backend = None**
The result store backend used for this task.

**BaseTask.default_retry_delay = 180**
Default time in seconds before a retry of the task should be executed. 3 minutes by default.

**classmethod BaseTask.delay(*args, **kwargs)**
Star argument version of `apply_async()`.
Does not support the extra options enabled by `apply_async()`.

**Parameters**
• *args – positional arguments passed on to the task.
• **kwargs – keyword arguments passed on to the task.

:returns celery.result.AsyncResult:

BaseTask.delivery_mode = None
Override the apps default delivery mode for this task. Default is “persistent”, but you can change this to “transient”, which means messages will be lost if the broker is restarted. Consult your broker manual for any additional delivery modes.

BaseTask.error_whitelist = ()
List of exception types to send error e-mails for.

classmethod BaseTask.establish_connection(connect_timeout=None)
Establish a connection to the message broker.

BaseTask.exchange = None
Overrides the apps default exchange for this task.

BaseTask.exchange_type = None
Overrides the apps default exchange type for this task.

BaseTask.execute(request, pool, loglevel, logfile, **kwargs)
The method the worker calls to execute the task.

Parameters
• request – A TaskRequest.
• pool – A task pool.
• loglevel – Current loglevel.
• logfile – Name of the currently used logfile.
• consumer – The Consumer.

BaseTask.expires = None
Default task expiry time.

classmethod BaseTask.get_consumer(connection=None, connect_timeout=None)
Get message consumer.

:rtype kombu.messaging.Consumer:

Warning: If you don’t specify a connection, one will automatically be established for you, in that case you need to close this connection after use:

```python
>>> consumer = self.get_consumer()
>>> # do something with consumer
>>> consumer.close()
>>> consumer.connection.close()
```

classmethod BaseTask.get_logger(loglevel=None, logfile=None, propagate=False, **kwargs)
Get task-aware logger object.

classmethod BaseTask.get_publisher(connection=None, exchange=None, connect_timeout=None, exchange_type=None, **options)
Get a celery task message publisher.

:rtype TaskPublisher:
Warning: If you don’t specify a connection, one will automatically be established for you, in that case you need to close this connection after use:

```python
>>> publisher = self.get_publisher()
>>> # ... do something with publisher
>>> publisher.connection.close()
```

or used as a context:

```python
>>> with self.get_publisher() as publisher:
    ...
    # ... do something with publisher
```

**BaseTask.ignore_result** = False

If enabled the worker will not store task state and return values for this task. Defaults to the `CELERY_IGNORE_RESULT` setting.

**BaseTask.immediate** = False

Request immediate delivery.

**BaseTask.mandatory** = False

Mandatory message routing.

**BaseTask.max_retries** = 3

Maximum number of retries before giving up. If set to `None`, it will never stop retrying.

**BaseTask.name** = None

Name of the task.

**BaseTask.on_failure**(exc, task_id, args, kwargs, einfo=None)

Error handler.

This is run by the worker when the task fails.

**Parameters**

- **exc** – The exception raised by the task.
- **task_id** – Unique id of the failed task.
- **args** – Original arguments for the task that failed.
- **kwargs** – Original keyword arguments for the task that failed.
- **einfo** – `ExceptionInfo` instance, containing the traceback.

The return value of this handler is ignored.

**BaseTask.on_retry**(exc, task_id, args, kwargs, einfo=None)

Retry handler.

This is run by the worker when the task is to be retried.

**Parameters**

- **exc** – The exception sent to `retry()`.
- **task_id** – Unique id of the retried task.
- **args** – Original arguments for the retried task.
- **kwargs** – Original keyword arguments for the retried task.
- **einfo** – `ExceptionInfo` instance, containing the traceback.

The return value of this handler is ignored.
Celery Documentation, Release 2.2.10

BaseTask.on_success(retval, task_id, args, kwargs)
Success handler.
Run by the worker if the task executes successfully.

Parameters
- **retval** – The return value of the task.
- **task_id** – Unique id of the executed task.
- **args** – Original arguments for the executed task.
- **kwargs** – Original keyword arguments for the executed task.

The return value of this handler is ignored.

BaseTask.priority = None
Default message priority. A number between 0 to 9, where 0 is the highest. Note that RabbitMQ does not support priorities.

BaseTask.queue = None
Destination queue. The queue needs to exist in CELERY_QUEUES. The routing_key, exchange and exchange_type attributes will be ignored if this is set.

BaseTask.rate_limit = None
Rate limit for this task type. Examples: None (no rate limit), “100/s” (hundred tasks a second), “100/m” (hundred tasks a minute), “100/h” (hundred tasks an hour)

BaseTask.request = <celery.task.base.Context object at 0x6a1a050>
Request context (set when task is applied).

classmethod BaseTask.retry(args=None, kwargs=None, exc=None, throw=True, eta=None, countdown=None, max_retries=None, **options)
Retry the task.

Parameters
- **args** – Positional arguments to retry with.
- **kwargs** – Keyword arguments to retry with.
- **exc** – Optional exception to raise instead of MaxRetriesExceededError when the max restart limit has been exceeded.
- **countdown** – Time in seconds to delay the retry for.
- **eta** – Explicit time and date to run the retry at (must be a datetime instance).
- **max_retries** – If set, overrides the default retry limit.
- ****options – Any extra options to pass on to meth:apply_async.
- **throw** – If this is False, do not raise the RetryTaskError exception, that tells the worker to mark the task as being retried. Note that this means the task will be marked as failed if the task raises an exception, or successful if it returns.

Raises celery.exceptions.RetryTaskError To tell the worker that the task has been re-sent for retry. This always happens, unless the throw keyword argument has been explicitly set to False, and is considered normal operation.

Example

```python
>>> @task
>>> def tweet(auth, message):
...     twitter = Twitter(oauth=auth)
```
... try:
...     twitter.post_status_update(message)
... except twitter.FailWhale, exc:
...     # Retry in 5 minutes.
...     return tweet.retry(countdown=60 * 5, exc=exc)

Although the task will never return above as `retry` raises an exception to notify the worker, we use `return` in front of the retry to convey that the rest of the block will not be executed.

`BaseTask.routing_key = None`
Overrides the apps default `routing_key` for this task.

`BaseTask.run(*args, **kwargs)`
The body of the task executed by workers.

`BaseTask.send_error_emails = False`
If enabled an e-mail will be sent to `ADMINS` whenever a task of this type fails.

`BaseTask.serializer = 'pickle'`
The name of a serializer that are registered with `kombu.serialization.registry`. Default is "pickle".

`BaseTask.store_errors_even_if_ignored = False`
When enabled errors will be stored even if the task is otherwise configured to ignore results.

`classmethod BaseTask.subtask(*args, **kwargs)`
Returns `subtask` object for this task, wrapping arguments and execution options for a single task invocation.

`BaseTask.track_started = False`
If enabled the task will report its status as “started” when the task is executed by a worker. Disabled by default as the normal behaviour is to not report that level of granularity. Tasks are either pending, finished, or waiting to be retried.

Having a “started” status can be useful for when there are long running tasks and there is a need to report which task is currently running.

The application default can be overridden using the `CELERY_TRACK_STARTED` setting.

`BaseTask.type = 'regular'`
The type of task (no longer used).

`BaseTask.update_state(task_id=None, state=None, meta=None)`
Update task state.

Parameters:
- `task_id` – Id of the task to update.
- `state` – New state (str).
- `meta` – State metadata (dict).

`class celery.task.base.PeriodicTask`
A periodic task is a task that behaves like a `cron` job.

Results of periodic tasks are not stored by default.

`run_every`  
`REQUIRED` Defines how often the task is run (its interval), it can be a `timedelta` object, a `crontab` object or an integer specifying the time in seconds.
relative
If set to True, run times are relative to the time when the server was started. This was the previous
behaviour, periodic tasks are now scheduled by the clock.

Raises NotImplementedError if the run_every attribute is not defined.

Example

```python
>>> from celery.task import tasks, PeriodicTask
>>> from datetime import timedelta

>>> class EveryThirtySecondsTask(PeriodicTask):
...     run_every = timedelta(seconds=30)
...     
...     def run(self, **kwargs):
...         logger = self.get_logger(**kwargs)
...         logger.info("Execute every 30 seconds")

>>> from celery.task import PeriodicTask
>>> from celery.schedules import crontab

>>> class EveryMondayMorningTask(PeriodicTask):
...     run_every = crontab(hour=7, minute=30, day_of_week=1)
...     
...     def run(self, **kwargs):
...         logger = self.get_logger(**kwargs)
...         logger.info("Execute every Monday at 7:30AM.")

>>> class EveryMorningTask(PeriodicTask):
...     run_every = crontab(hours=7, minute=30)
...     
...     def run(self, **kwargs):
...         logger = self.get_logger(**kwargs)
...         logger.info("Execute every day at 7:30AM.")

>>> class EveryQuarterPastTheHourTask(PeriodicTask):
...     run_every = crontab(minute=15)
...     
...     def run(self, **kwargs):
...         logger = self.get_logger(**kwargs)
...         logger.info("Execute every 0:15 past the hour every day.")

is_due(last_run_at)
Returns tuple of two items (is_due, next_time_to_run), where next time to run is in seconds.

See celery.schedules.schedule.is_due() for more information.

remaining_estimate(last_run_at)
Returns when the periodic task should run next as a timedelta.

timedelta_seconds(delta)
Convert timedelta to seconds.

Doesn’t account for negative timedeltas.

class celery.task.base.TaskType
Metaclass for tasks.

Automatically registers the task in the task registry, except if the abstract attribute is set.

If no name attribute is provided, the name is automatically set to the name of the module it was defined in, and
the class name.
10.6 celery.task.sets

class celery.task.sets.TaskSet (task=None, tasks=None, app=None, Publisher=None)

A task containing several subtasks, making it possible to track how many, or when all of the tasks have been completed.

Parameters tasks — A list of subtask instances.

Example:

```python
>>> urls = ("http://cnn.com/rss", "http://bbc.co.uk/rss")
>>> taskset = TaskSet(refresh_feed.subtask((url, )) for url in urls)
>>> taskset_result = taskset.apply_async()
>>> list_of_return_values = taskset_result.join() # *expensive*
```

apply (taskset_id=None)
Applies the taskset locally by blocking until all tasks return.

apply_async (connection=None, connect_timeout=None, publisher=None, taskset_id=None)
Apply taskset.

task
task_name
tasks
total = None
Total number of subtasks in this set.

class celery.task.sets.subtask (task=None, args=None, kwargs=None, options=None, **ex)

Class that wraps the arguments and execution options for a single task invocation.

Used as the parts in a TaskSet or to safely pass tasks around as callbacks.

Parameters

• task — Either a task class/instance, or the name of a task.
• args — Positional arguments to apply.
• kwargs — Keyword arguments to apply.
• options — Additional options to celery.execute.apply_async().

Note that if the first argument is a dict, the other arguments will be ignored and the values in the dict will be used instead.

```python
>>> s = subtask("tasks.add", args=(2, 2))
>>> subtask(s)
{"task": "tasks.add", args=(2, 2), kwargs={}, options={}}
```

apply (args=(), kwargs={}, **options)
Apply this task locally.

apply_async (args=(), kwargs={}, **options)
Apply this task asynchronously.

delay (*argmerge, **kwmerge)
Shortcut to apply_async(argmerge, kwargs).

get_type ()
type
10.7 celery.result

class celery.resultAsyncResult (task_id, backend=None, task_name=None, app=None)
Pending task result using the default backend.

Parameters
- task_id – The tasks uuid.

backend = None
Task result store backend to use.

class celery.result.BaseAsyncResult (task_id, backend, task_name=None, app=None)
Base class for pending result, supports custom task result backend.

Parameters
- task_id – see `task_id`.
- backend – see `backend`.

exception TimeoutError
Error raised for timeouts.

BaseAsyncResult.backend = None
The task result backend to use.

BaseAsyncResult.failed ()
Returns True if the task failed by exception.

BaseAsyncResult.forget ()
Forget about (and possibly remove the result of) this task.

BaseAsyncResult.get (timeout=None, propagate=True, interval=0.5)
Wait until task is ready, and return its result.

Warning: Waiting for subtasks may lead to deadlocks. Please read Avoid launching synchronous subtasks.

Parameters
- timeout – How long to wait, in seconds, before the operation times out.
- propagate – Re-raise exception if the task failed.
- interval – Time to wait (in seconds) before retrying to retrieve the result. Note that this does not have any effect when using the AMQP result store backend, as it does not use polling.

Raisess celery.exceptions.TimeoutError if `timeout` is not None and the result does not arrive within `timeout` seconds.

If the remote call raised an exception then that exception will be re-raised.

BaseAsyncResult.info
Get state metadata. Alias to `result()`.

BaseAsyncResult.ready ()
Returns True if the task has been executed.
If the task is still running, pending, or is waiting for retry then False is returned.

BaseAsyncResult.result
When the task has been executed, this contains the return value. If the task raised an exception, this will be the exception instance.
BaseAsyncResult.revoke(connection=None, connect_timeout=None)

Send revoke signal to all workers.

Any worker receiving the task, or having reserved the task, must ignore it.

BaseAsyncResult.state

The tasks current state.

Possible values includes:

**PENDING**

The task is waiting for execution.

**STARTED**

The task has been started.

**RETRY**

The task is to be retried, possibly because of failure.

**FAILURE**

The task raised an exception, or has been retried more times than its limit. The result attribute contains the exception raised.

**SUCCESS**

The task executed successfully. The result attribute contains the resulting value.

BaseAsyncResult.status

Deprecated alias of state.

BaseAsyncResult.successful()

Returns True if the task executed successfully.

BaseAsyncResult.task_id = None

The task uuid.

BaseAsyncResult.traceback

Get the traceback of a failed task.

BaseAsyncResult.wait(*args, **kwargs)

Deprecated alias to get().

class celery.result.EagerResult(task_id, ret_value, state, traceback=None)

Result that we know has already been executed.

exception TimeoutError

The operation timed out.

EagerResult.get(timeout=None, propagate=True, **kwargs)

Wait until the task has been executed and return its result.

EagerResult.ready()

Returns True if the task has been executed.

EagerResult.result

The tasks return value

EagerResult.revoke()

EagerResult.state

The tasks state.
EagerResult.**status**
The tasks status (alias to `state`).

EagerResult.**successful**()
Returns True if the task executed without failure.

EagerResult.**traceback**
The traceback if the task failed.

class celery.result.**TaskSetResult**(*taskset_id, subtasks, app=None*)
Working with `TaskSet` results.

An instance of this class is returned by `TaskSet`'s `apply_async()`. It enables inspection of the subtasks state and return values as a single entity.

**Parameters**

- **taskset_id** – The id of the taskset.
- **subtasks** – List of result instances.

**completed_count**()
Task completion count.

**Returns** the number of tasks completed.

**failed**()
Did the taskset fail?

**Returns** True if any of the tasks in the taskset failed. (i.e., raised an exception)

**forget**()
Forget about (and possible remove the result of) all the tasks in this taskset.

**iter_native**(*timeout=None*)

**iterate**()
Iterate over the return values of the tasks as they finish one by one.

**Raises** The exception if any of the tasks raised an exception.

**itersubtasks**()
Taskset subtask iterator.

**Returns** an iterator for iterating over the tasksets `AsyncResult` objects.

**join**(*timeout=None, propagate=True, interval=0.5*)
Gathers the results of all tasks in the taskset, and returns a list ordered by the order of the set.

**Note:** This can be an expensive operation for result store backends that must resort to polling (e.g. database).

You should consider using `join_native()` if your backend supports it.

**Warning:** Waiting for subtasks may lead to deadlocks. Please see *Avoid launching synchronous subtasks.*

**Parameters**

- **timeout** – The number of seconds to wait for results before the operation times out.
- **propagate** – If any of the subtasks raises an exception, the exception will be re-raised.
• **interval** – Time to wait (in seconds) before retrying to retrieve a result from the set. Note that this does not have any effect when using the AMQP result store backend, as it does not use polling.

  **Raises** `celery.exceptions.TimeoutError` if `timeout` is not `None` and the operation takes longer than `timeout` seconds.

  `join_native(timeout=None, propagate=True)`
  Backend optimized version of `join()`.
  New in version 2.2.
  Note that this does not support collecting the results for different task types using different backends.
  This is currently only supported by the AMQP result backend.

  `ready()`
  Is the task ready?

  **Returns** `True` if all of the tasks in the taskset has been executed.

  `classmethod restore(taskset_id, backend=None)`
  Restore previously saved taskset result.

  `revoke(connection=None, connect_timeout=None)`
  Revoke all subtasks.

  `save(backend=None)`
  Save taskset result for later retrieval using `restore()`.

  Example:
  ```python
  >>> result.save()
  >>> result = TaskSetResult.restore(taskset_id)
  ```

  `subtasks = None`
  A list of `AsyncResult` instances for all of the subtasks.

  `successful()`
  Was the taskset successful?

  **Returns** `True` if all of the tasks in the taskset finished successfully (i.e. did not raise an exception).

  `taskset_id = None`
  The UUID of the taskset.

  `total`
  Total number of subtasks in the set.

  `waiting()`
  Is the taskset waiting?

  **Returns** `True` if any of the tasks in the taskset is still waiting for execution.

### 10.8 celery.task

**celery.task.task(*args, **kwargs)**
Decorator to create a task class out of any callable.

**Examples**
@task()
def refresh_feed(url):
    return Feed.objects.get(url=url).refresh()

With setting extra options and using retry.

@task(max_retries=10)
def refresh_feed(url):
    try:
        return Feed.objects.get(url=url).refresh()
    except socket.error, exc:
        refresh_feed.retry(exc=exc)

Calling the resulting task:

>>> refresh_feed("http://example.com/rss")  # Regular
<Feed: http://example.com/rss>

>>> refresh_feed.delay("http://example.com/rss")  # Async
<AsyncResult: 8998d0f4-da0b-4669-ba03-d5ab5ac6ad5d>

celery.task.periodic_task(*args, **options)
Decorator to create a task class out of any callable.

Examples
@task()
def refresh_feed(url):
    return Feed.objects.get(url=url).refresh()

With setting extra options and using retry.

@task(exchange="feeds")
def refresh_feed(url, **kwargs):
    try:
        return Feed.objects.get(url=url).refresh()
    except socket.error, exc:
        refresh_feed.retry(args=[url], kwargs=kwargs, exc=exc)

Calling the resulting task:

>>> refresh_feed("http://example.com/rss")  # Regular
<Feed: http://example.com/rss>

>>> refresh_feed.delay("http://example.com/rss")  # Async
<AsyncResult: 8998d0f4-da0b-4669-ba03-d5ab5ac6ad5d>

class celery.task.Task
Task base class.

When called tasks apply the run() method. This method must be defined by all tasks (that is unless the
__call__() method is overridden).

See also:
celery.task.base.BaseTask.
10.9 celery.task.control

class celery.task.control.Control(app)

    class Mailbox (namespace, type='direct', connection=None)

        Node (hostname=None, state=None, channel=None, handlers=None)
        abcast (command, kwargs={})
        call (destination, command, kwargs={}, timeout=None, callback=None, channel=None)
        cast (destination, command, kwargs={})
        connection = None
        exchange = None
        exchange_fmt = '%s.pidbox'
        get_queue (hostname)
        get_reply_queue (ticket)
        multi_call (command, kwargs={}, timeout=1, limit=None, callback=None, channel=None)
        namespace = None
        node_cls
            alias of Node
        reply_exchange = None
        reply_exchange_fmt = 'reply.%s.pidbox'
        type = 'direct'

    Control.broadcast (command, arguments=None, destination=None, connection=None, connect_timeout=None, reply=False, timeout=1, limit=None, callback=None, channel=None)

Broadcast a control command to the celery workers.

Parameters

- **command** – Name of command to send.
- **arguments** – Keyword arguments for the command.
- **destination** – If set, a list of the hosts to send the command to, when empty broadcast to all workers.
- **connection** – Custom broker connection to use, if not set, a connection will be established automatically.
- **connect_timeout** – Timeout for new connection if a custom connection is not provided.
- **reply** – Wait for and return the reply.
- **timeout** – Timeout in seconds to wait for the reply.
- **limit** – Limit number of replies.
- **callback** – Callback called immediately for each reply received.
Control.discard_all (connection=None, connect_timeout=None)
Discard all waiting tasks.

This will ignore all tasks waiting for execution, and they will be deleted from the messaging server.

Returns the number of tasks discarded.

Control.inspect (destination=None, timeout=1, callback=None)
Control.ping (destination=None, timeout=1, **kwargs)
Ping workers.

Returns answer from alive workers.

Parameters

• destination – If set, a list of the hosts to send the command to, when empty broadcast to all workers.
• connection – Custom broker connection to use, if not set, a connection will be established automatically.
• connect_timeout – Timeout for new connection if a custom connection is not provided.
• reply – Wait for and return the reply.
• timeout – Timeout in seconds to wait for the reply.
• limit – Limit number of replies.

Control.rate_limit (task_name, rate_limit, destination=None, **kwargs)
Set rate limit for task by type.

Parameters

• task_name – Type of task to change rate limit for.
• rate_limit – The rate limit as tasks per second, or a rate limit string (“100/m”, etc. see celery.task.base.Task.rate_limit for more information).
• destination – If set, a list of the hosts to send the command to, when empty broadcast to all workers.
• connection – Custom broker connection to use, if not set, a connection will be established automatically.
• connect_timeout – Timeout for new connection if a custom connection is not provided.
• reply – Wait for and return the reply.
• timeout – Timeout in seconds to wait for the reply.
• limit – Limit number of replies.

Control.revoke (task_id, destination=None, terminate=False, signal='SIGTERM', **kwargs)
Revoke a task by id.

If a task is revoked, the workers will ignore the task and not execute it after all.

Parameters

• task_id – Id of the task to revoke.
• terminate – Also terminate the process currently working on the task (if any).
• signal – Name of signal to send to process if terminate. Default is TERM.
• **destination** – If set, a list of the hosts to send the command to, when empty broadcast to all workers.

• **connection** – Custom broker connection to use, if not set, a connection will be established automatically.

• **connect_timeout** – Timeout for new connection if a custom connection is not provided.

• **reply** – Wait for and return the reply.

• **timeout** – Timeout in seconds to wait for the reply.

• **limit** – Limit number of replies.

```
class celery.task.control.Inspect (control, destination=None, timeout=1, callback=None)

active (safe=False)
active_queues ()
add_consumer (queue, exchange=None, exchange_type='direct', routing_key=None, **options)
cancel_consumer (queue, **kwargs)
disable_events ()
enable_events ()
ping ()
registered_tasks ()
reserved (safe=False)
revoked ()
scheduled (safe=False)
stats ()
```

celery.task.control.flatten_reply (reply)

### 10.10 celery.task.http

```
class celery.task.http.HttpDispatch (url, method, task_kwargs, logger)
Make task HTTP request and collect the task result.

Parameters

- **url** – The URL to request.
- **method** – HTTP method used. Currently supported methods are *GET* and *POST*.
- **task_kwars** – Task keyword arguments.
- **logger** – Logger used for user/system feedback.

dispatch ()
Dispatch callback and return result.

http_headers

make_request (url, method, params)
Makes an HTTP request and returns the response.
```
timeout = 5
user_agent = ‘celery/2.2.10’

class celery.task.http.HttpDispatchTask
Task dispatching to an URL.

Parameters

- **url** – The URL location of the HTTP callback task.
- **method** – Method to use when dispatching the callback. Usually *GET* or *POST*.
- **kwargs** – Keyword arguments to pass on to the HTTP callback.

url
If this is set, this is used as the default URL for requests. Default is to require the user of the task to supply the url as an argument, as this attribute is intended for subclasses.

method
If this is set, this is the default method used for requests. Default is to require the user of the task to supply the method as an argument, as this attribute is intended for subclasses.

method = None

name = ‘celery.task.http.HttpDispatchTask’

run (url=None, method=’GET’, **kwargs)

url = None

exception celery.task.http.InvalidResponseError
The remote server gave an invalid response.

class celery.task.http.MutableURL(url)
Object wrapping a Uniform Resource Locator.

Supports editing the query parameter list. You can convert the object back to a string, the query will be properly urlencoded.

Examples

```python
>>> url = URL("http://www.google.com:6580/foo/bar?x=3&y=4#foo")
>>> url.query
{'x': '3', 'y': '4'}
>>> str(url)
'http://www.google.com:6580/foo/bar?y=4&x=3#foo'
>>> url.query["x"] = 10
>>> url.query.update({"George": "Costanza"})
>>> str(url)
'http://www.google.com:6580/foo/bar?y=4&x=10&George=Costanza#foo'
```

exception celery.task.http.RemoteExecuteError
The remote task gave a custom error.

class celery.task.http.URL (url, dispatcher=None)
HTTP Callback URL

Supports requesting an URL asynchronously.

Parameters

- **url** – URL to request.
- **dispatcher** – Class used to dispatch the request. By default this is *HttpDispatchTask*. 
dispatcher
   alias of HttpDispatchTask
get_async(**kwargs)
post_async(**kwargs)

exception celery.task.http.UnknownStatusError
   The remote server gave an unknown status.

celery.task.http.extract_response(raw_response)
   Extract the response text from a raw JSON response.

celery.task.http.maybe_utf8(value)
   Encode to utf-8, only if the value is Unicode.

celery.task.http.utf8dict(tup)
   With a dict’s items() tuple return a new dict with any utf-8 keys/values encoded.

10.11 celery.schedules

class celery.schedules.crontab(minute='*', hour='*', day_of_week='*', nowfun=<built-in method
   now of type object at 0xf488b2d5c40>)
   A crontab can be used as the run_every value of a PeriodicTask to add cron-like scheduling.

   Like a cron job, you can specify units of time of when you would like the task to execute. It is a reasonably
   complete implementation of cron’s features, so it should provide a fair degree of scheduling needs.

   You can specify a minute, an hour, and/or a day of the week in any of the following formats:

   minute
      • A (list of) integers from 0-59 that represent the minutes of an hour of when execution should occur; or
      • A string representing a crontab pattern. This may get pretty advanced, like minute="*/15" (for every quarter) or minute="1,13,30-45,50-59/2".

   hour
      • A (list of) integers from 0-23 that represent the hours of a day of when execution should occur; or
      • A string representing a crontab pattern. This may get pretty advanced, like hour="*/3" (for every three hours) or hour="0,8-17/2" (at midnight, and every two hours during office hours).

   day_of_week
      • A (list of) integers from 0-6, where Sunday = 0 and Saturday = 6, that represent the days of a week
         that execution should occur.
      • A string representing a crontab pattern. This may get pretty advanced, like day_of_week="mon-fri" (for weekdays only). (Beware that day_of_week="*/2" does not literally mean “every two days”, but
         “every day that is divisible by two”!

is_due(last_run_at)
   Returns tuple of two items (is_due, next_time_to_run), where next time to run is in seconds.

   See celery.schedules.schedule.is_due() for more information.

remaining_estimate(last_run_at)
   Returns when the periodic task should run next as a timedelta.
class celery.schedules.crontab_parser(max_=60)
Parser for crontab expressions. Any expression of the form ‘groups’ (see BNF grammar below) is accepted and expanded to a set of numbers. These numbers represent the units of time that the crontab needs to run on:

digit :: '0'..'9'
dow :: 'a'..'z'
number :: digit+ | dow+
steps :: number
range :: number ( '-' number ) ?
numspec :: '*' | range
expr :: numspec ( '/' steps ) ?
groups :: expr ( ',' expr ) *

The parser is a general purpose one, useful for parsing hours, minutes and day_of_week expressions. Example usage:

>>> minutes = crontab_parser(60).parse("*/15")
[0, 15, 30, 45]
>>> hours = crontab_parser(24).parse("*/4")
[0, 4, 8, 12, 16, 20]
>>> day_of_week = crontab_parser(7).parse("*")
[0, 1, 2, 3, 4, 5, 6]

parse(cronspec)
celery.schedules.maybe_schedule(s, relative=False)

class celery.schedules.schedule(run_every=None, relative=False)

is_due(last_run_at)
Returns tuple of two items (is_due, next_time_to_run), where next time to run is in seconds.

e.g.

• *(True, 20), means the task should be run now, and the next time to run is in 20 seconds.
• *(False, 12), means the task should be run in 12 seconds.

You can override this to decide the interval at runtime, but keep in mind the value of CELERYBEAT_MAX_LOOP_INTERVAL, which decides the maximum number of seconds celerybeat can sleep between re-checking the periodic task intervals. So if you dynamically change the next run at value, and the max interval is set to 5 minutes, it will take 5 minutes for the change to take effect, so you may consider lowering the value of CELERYBEAT_MAX_LOOP_INTERVAL if responsiveness is of importance to you.

relative = False

remaining_estimate(last_run_at)
Returns when the periodic task should run next as a timedelta.

10.12 celery.signals

Signals allows decoupled applications to receive notifications when certain actions occur elsewhere in the application.

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10.12.1 Basics

Several kinds of events trigger signals, you can connect to these signals to perform actions as they trigger.

Example connecting to the `task_sent` signal:

```python
from celery.signals import task_sent
def task_sent_handler(sender=None, task_id=None, task=None, args=None, kwargs=None, **kwds):
    print("Got signal task_sent for task id %s" % (task_id, ))

task_sent.connect(task_sent_handler)
```

Some signals also have a sender which you can filter by. For example the `task_sent` signal uses the task name as a sender, so you can connect your handler to be called only when tasks with name “tasks.add” has been sent by providing the `sender` argument to `connect`:

```python
task_sent.connect(task_sent_handler, sender="tasks.add")
```

10.12.2 Signals

Task Signals

`task_sent`

Dispatched when a task has been sent to the broker. Note that this is executed in the client process, the one sending the task, not in the worker.
Sender is the name of the task being sent.

Provides arguments:

- **task_id**  Id of the task to be executed.
- **task**  The task being executed.
- **args**  the tasks positional arguments.
- **kwargs**  The tasks keyword arguments.
- **eta**  The time to execute the task.
- **taskset**  Id of the taskset this task is part of (if any).

**task_prerun**

Dispatched before a task is executed.

Sender is the task class being executed.

Provides arguments:

- **task_id**  Id of the task to be executed.
- **task**  The task being executed.
- **args**  the tasks positional arguments.
- **kwargs**  The tasks keyword arguments.

**task_postrun**

Dispatched after a task has been executed.

Sender is the task class executed.

Provides arguments:

- **task_id**  Id of the task to be executed.
- **task**  The task being executed.
- **args**  the tasks positional arguments.
- **kwargs**  The tasks keyword arguments.
- **retval**  The return value of the task.

**task_failure**

Dispatched when a task fails.

Sender is the task class executed.

Provides arguments:

- **task_id**  Id of the task.
- **exception**  Exception instance raised.
- **args**  Positional arguments the task was called with.
• **kwargs**  Keyword arguments the task was called with.
• **traceback**  Stack trace object.
• **einfo**  The `celery.datastructures.ExceptionInfo` instance.

**Worker Signals**

**worker_init**

Dispatched before the worker is started.

**worker_ready**

Dispatched when the worker is ready to accept work.

**worker_process_init**

Dispatched by each new pool worker process when it starts.

**worker_shutdown**

Dispatched when the worker is about to shut down.

**Celerybeat Signals**

**beat_init**

Dispatched when celerybeat starts (either standalone or embedded). Sender is the `celery.beat.Service` instance.

**beat_embedded_init**

Dispatched in addition to the `beat_init` signal when celerybeat is started as an embedded process. Sender is the `celery.beat.Service` instance.

**Eventlet Signals**

**eventlet_pool_started**

Sent when the eventlet pool has been started.
Sender is the `celery.concurrency.evlet.TaskPool` instance.

**eventlet_pool_preshutdown**

Sent when the worker shutdown, just before the eventlet pool is requested to wait for remaining workers.
Sender is the `celery.concurrency.evlet.TaskPool` instance.
eventlet_pool_postshutdown

Sent when the pool has been joined and the worker is ready to shutdown. Sender is the celery.concurrency.evlet.TaskPool instance.

eventlet_pool_apply

Sent whenever a task is applied to the pool. Sender is the celery.concurrency.evlet.TaskPool instance. Provides arguments:
- target
  The target function.
- args
  Positional arguments.
- kwargs
  Keyword arguments.

Logging Signals

after_setup_task_logger

Sent after the setup of every single task logger. Provides arguments:
- logger
  The logger object.
- loglevel
  The level of the logging object.
- logfile
  The name of the logfile.
- format
  The log format string.
- colorize
  Specify if log messages are colored or not.

after_setup_logger

Sent after the setup of every global logger. Provides arguments:
- logger
  The logger object.
- loglevel
  The level of the logging object.
- logfile
  The name of the logfile.
- format
  The log format string.
- colorize
  Specify if log messages are colored or not.
10.13 celery.exceptions

- **exception** `celery.exceptions.AlreadyRegistered`
  The task is already registered.

- **exception** `celery.exceptions.ImproperlyConfigured`
  Celery is somehow improperly configured.

- **exception** `celery.exceptions.MaxRetriesExceededError`
  The task's max restart limit has been exceeded.

- **exception** `celery.exceptions.NotConfigured`
  Celery has not been configured, as no config module has been found.

- **exception** `celery.exceptions.NotRegistered`
  The task is not registered.

- **exception** `celery.exceptions.QueueNotFound`
  Task routed to a queue not in CELERY_QUEUES.

- **exception** `celery.exceptions.RetryTaskError(message, exc, *args, **kwargs)`
  The task is to be retried later.

- **exception** `celery.exceptions.SoftTimeLimitExceeded`
  The soft time limit has been exceeded. This exception is raised to give the task a chance to clean up.

- **exception** `celery.exceptions.SystemTerminate`
  Signals that the worker should terminate.

- **exception** `celery.exceptions.TaskRevokedError`
  The task has been revoked, so no result available.

- **exception** `celery.exceptions.TimeLimitExceeded`
  The time limit has been exceeded and the job has been terminated.

- **exception** `celery.exceptions.TimeoutError`
  The operation timed out.

- **exception** `celery.exceptions.WorkerLostError`
  The worker processing a job has exited prematurely.

10.14 celery.loaders

- `celery.loaders.current_loader()`  
  Detect and return the current loader.

- `celery.loaders.get_loader_cls(loader)`  
  Get loader class by name/alias

- `celery.loaders.load_settings()`  
  Load the global settings object.

- `celery.loaders.setup_loader()`

10.15 celery.loaders.app

- `class celery.loaders.app.AppLoader(app=None, **kwargs)`
on_worker_init()
read_configuration()

10.16 celery.loaders.default

class celery.loaders.default.Load(app=None, **kwargs)
The default loader.
See the FAQ for example usage.
on_worker_init()
Imports modules at worker init so tasks can be registered and used by the worked.
The list of modules to import is taken from the CELERY_IMPORTS setting.
read_configuration()
Read configuration from celeryconfig.py and configure celery and Django so it can be used by regular Python.
setup_settings(settingsdict)
celery.loaders.default.wanted_module_item(item)

10.17 celery.loaders.base

class celery.loaders.base.BaseLoader(app=None, **kwargs)
The base class for loaders.
Loaders handles to following things:
• Reading celery client/worker configurations.
• What happens when a task starts? See on_task_init().
• What happens when the worker starts? See on_worker_init().
• What modules are imported to find tasks?
cmdline_config_parser(args, namespace='celery', re_type=<_sre.SRE_Pattern object at 0x1d984e0>, extra_types={'json': <function loads at 0x1dcc1b8>}, override_types={'dict': 'json', 'list': 'json', 'tuple': 'json'}
conf
Loader configuration.
config_from_envvar(variable_name, silent=False)
config_from_object(obj, silent=False)
configured=False
import_default_modules()
import_from_cwd(module, imp=None)
import_module(module)
import_task_module(module)
init_worker()
mail

mail_admins(subject, body, fail_silently=False, sender=None, to=None, host=None, port=None, user=None, password=None, timeout=None)

on_process_cleanup()
This method is called after a task is executed.

on_task_init(task_id, task)
This method is called before a task is executed.

on_worker_init()
This method is called when the worker (celeryd) starts.

override_backends = {}  
worker_initialized = False

10.18 celery.registry

celery.registry

class celery.registry.TaskRegistry

eception NotRegistered
The task is not registered.

TaskRegistry.filter_types(type)
Return all tasks of a specific type.

TaskRegistry.periodic()
Get all periodic task types.

TaskRegistry.pop(key, *args)

TaskRegistry.register(task)
Register a task in the task registry.

The task will be automatically instantiated if not already an instance.

TaskRegistry.regular()
Get all regular task types.

TaskRegistry.unregister(name)
Unregister task by name.

Parameters name – name of the task to unregister, or a celery.task.base.Task with a valid name attribute.

Raises celery.exceptions.NotRegistered if the task has not been registered.

celery.registry.tasks = {‘celery.backend_cleanup’: <@task: celery.backend_cleanup>, ‘celery.contrib.abortable.AbortableTask’}
Global task registry.
10.19 celery.states

Built-in Task States.

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10.19.1 States

See Task States.

10.19.2 Sets

READY_STATES
Set of states meaning the task result is ready (has been executed).

UNREADY_STATES
Set of states meaning the task result is not ready (has not been executed).

EXCEPTION_STATES
Set of states meaning the task returned an exception.

PROPAGATE_STATES
Set of exception states that should propagate exceptions to the user.

ALL_STATES
Set of all possible states.
10.19.3 Misc.

celery.states.PRECEDENCE = ['SUCCESS', 'FAILURE', None, 'REMOVED', 'STARTED', 'RECEIVED', 'RETRY', 'PENDING']

State precedence. None represents the precedence of an unknown state. Lower index means higher precedence.

celery.states.precedence(state)

Get the precedence index for state.

Lower index means higher precedence.

class celery.states.state

State is a subclass of str, implementing comparison methods adhering to state precedence rules.

10.20 celery.contrib.abortable

• Abortable tasks overview
  – Usage example

10.20.1 Abortable tasks overview

For long-running Task's, it can be desirable to support aborting during execution. Of course, these tasks should be built to support abortion specifically.

The AbortableTask serves as a base class for all Task objects that should support abortion by producers.

  • Producers may invoke the abort() method on AbortableAsyncResult instances, to request abortion.
  • Consumers (workers) should periodically check (and honor!) the is_aborted() method at controlled points in their task’s run() method. The more often, the better.

The necessary intermediate communication is dealt with by the AbortableTask implementation.

Usage example

In the consumer:

from celery.contrib.abortable import AbortableTask

class MyLongRunningTask(AbortableTask):

  def run(self, **kwargs):
    logger = self.get_logger(**kwargs)
    results = []
    for x in xrange(100):
      # Check after every 5 loops..
      if x % 5 == 0:
        # alternatively, check when some timer is due
        if self.is_aborted(**kwargs):
          # Respect the aborted status and terminate
          # gracefully
          logger.warning("Task aborted.")
          return None
      y = do_something_expensive(x)
      results.append(y)
logger.info("Task finished.")
return results

In the producer:

```python
from myproject.tasks import MyLongRunningTask
def myview(request):
    async_result = MyLongRunningTask.delay()
    # async_result is of type AbortableAsyncResult

    # After 10 seconds, abort the task
    time.sleep(10)
    async_result.abort()

...
```

After the `async_result.abort()` call, the task execution is not aborted immediately. In fact, it is not guaranteed to abort at all. Keep checking the `async_result` status, or call `async_result.wait()` to have it block until the task is finished.

**Note:** In order to abort tasks, there needs to be communication between the producer and the consumer. This is currently implemented through the database backend. Therefore, this class will only work with the database backends.

```python
class celery.contrib.abortable.AbortableAsyncResult(task_id, backend=None, task_name=None, app=None):
    Represents a abortable result.

    Specifically, this gives the AsyncResult a `abort()` method, which sets the state of the underlying Task to "ABORTED".

    `abort()`
    Set the state of the task to ABORTED.

    Abortable tasks monitor their state at regular intervals and terminate execution if so.

    Be aware that invoking this method does not guarantee when the task will be aborted (or even if the task will be aborted at all).

    is_aborted()
    Returns True if the task is (being) aborted.

class celery.contrib.abortable.AbortableTask
    A celery task that serves as a base class for all Task's that support aborting during execution.

    All subclasses of AbortableTask must call the is_aborted() method periodically and act accordingly when the call evaluates to True.

    classmethod AsyncResult(task_id)
    Returns the accompanying AbortableAsyncResult instance.

    is_aborted(**kwargs)
    Checks against the backend whether this AbortableAsyncResult is ABORTED.

    Always returns False in case the task_id parameter refers to a regular (non-abortable) Task.

    Be aware that invoking this method will cause a hit in the backend (for example a database query), so find a good balance between calling it regularly (for responsiveness), but not too often (for performance).

    name = 'celery.contrib.abortable.AbortableTask'
```
10.21 celery.contrib.batches

Collect messages and processes them as a list.

Example

A click counter that flushes the buffer every 100 messages, and every 10 seconds.

```python
from celery.task import task
from celery.contrib.batches import Batches

# Flush after 100 messages, or 10 seconds.
@task(base=Batches, flush_every=100, flush_interval=10)
def count_click(requests):
    from collections import Counter
    count = Counter(request.kwargs["url"] for request in requests)
    for url, count in count.items():
        print(">> Clicks: %s -> %s" % (url, count))

Registering the click is done as follows:

>>> count_click.delay(url="http://example.com")
```

Warning: For this to work you have to set CELERYD_PREFETCH_MULTIPLIER to zero, or some value where the final multiplied value is higher than flush_every. In the future we hope to add the ability to direct batching tasks to a channel with different QoS requirements than the task channel.

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API

class celery.contrib.batches.Batches

    apply_buffer (requests, args=(), kwargs={})
    debug (msg)
    execute (request, pool, loglevel, logfile)
    flush (requests)
    flush_every = 10
        Maximum number of message in buffer.
    flush_interval = 30
        Timeout in seconds before buffer is flushed anyway.
    logger
    run (requests)

class celery.contrib.batches.SimpleRequest (id, name, args, kwargs, delivery_info, hostname)
    Pickleable request.
    args = ()
        positional arguments
delivery_info = None
    message delivery information.

classmethod from_request (request)

hostname = None
    worker node name

id = None
    task id

kwargs = {}
    keyword arguments

name = None
    task name

10.22 celery.contrib.rdb

Remote debugger for Celery tasks running in multiprocessing pool workers. Inspired by
http://snippets.dzone.com/posts/show/7248

Usage

from celery.contrib import rdb
from celery.decorators import task

task
def add(x, y):
    result = x + y
    rdb.set_trace()
    return result

Environment Variables

CELERY_RDB_HOST
    Hostname to bind to. Default is ‘127.0.01’, which means the socket will only be accessible from the local host.

CELERY_RDB_PORT
    Base port to bind to. Default is 6899. The debugger will try to find an available port starting from the base port.
    The selected port will be logged by celeryd.

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celery.contrib.rdb.set_trace (frame=None)
    Set breakpoint at current location, or a specified frame

celery.contrib.rdb.debugger ()
    Returns the current debugger instance (if any), or creates a new one.

class celery.contrib.rdb.Rdb (host=‘127.0.0.1’, port=6899, port_search_limit=100, port_skew=0)
10.23 celery.events

celery.events.Event(type, **fields)
Create an event.

An event is a dictionary, the only required field is the type.

class celery.events.EventDispatcher(connection=None, hostname=None, enabled=True, channel=None, buffer_while_offline=True, app=None, serializer=None)
Send events as messages.

Parameters

• connection – Connection to the broker.
• hostname – Hostname to identify ourselves as, by default uses the hostname returned by socket.gethostname().
• enabled – Set to False to not actually publish any events, making send() a noop operation.
• channel – Can be used instead of connection to specify an exact channel to use when sending events.
• buffer_while_offline – If enabled events will be buffered while the connection is down. flush() must be called as soon as the connection is re-established.

You need to close() this after use.

close()
Close the event dispatcher.

copy_buffer(other)
disable()
enable()
flush()
send(type, **fields)
Send event.

Parameters

• type – Kind of event.
• **fields – Event arguments.

class celery.events.EventReceiver(connection, handlers=None, routing_key='#', node_id=None, app=None)
Capture events.

Parameters

• connection – Connection to the broker.
• handlers – Event handlers.

handlers is a dict of event types and their handlers, the special handler "*" captures all events that don’t have a handler.

capture(limit=None, timeout=None, wakeup=True)
Open up a consumer capturing events.
This has to run in the main process, and it will never stop unless forced via KeyboardInterrupt or SystemExit.

```python
def consumer() -> celeryevents.Events
    Create event consumer.
```

**Warning:** This creates a new channel that needs to be closed by calling `consumer.channel.close()`.

```python
def drain_events(limit=None, timeout=None)
    handlers ={}

def itercapture(limit=None, timeout=None, wakeup=True)

def process(type, event)
    Process the received event by dispatching it to the appropriate handler.

def wakeup_workers(channel=None)
```

```python
class celeryevents.Events(app=None)
    Dispatcher(connection=None, hostname=None, enabled=True, channel=None, buffer_while_offline=True)

def Receiver(connection, handlers=None, routing_key='#', node_id=None)

def State()

def celeryevents.create_event(type, fields)
```

## 10.24 celery.events.state

```python
class celeryevents.state.Element
    Base class for worker state elements.

celeryevents.state.HEARTBEAT_EXPIRE = 150
    Heartbeat expiry time in seconds. The worker will be considered offline if no heartbeat is received within this time. Default is 2:30 minutes.

class celeryevents.state.State(callback=None, max_workers_in_memory=5000, max_tasks_in_memory=10000)
    Records clusters state.

def alive_workers()
    Returns a list of (seemingly) alive workers.

def clear(ready=True)

def clear_tasks(ready=True)

def event(event)

def event_count = 0

```

```python
def freeze_while(func, *args, **kwargs)

def get_or_create_task(uuid)
    Get or create task by uuid.

def get_or_create_worker(hostname, **kwargs)
    Get or create worker by hostname.
```
task_count = 0

```python
task_event (type, fields)
    Process task event.
```

```python
task_types ()
    Returns a list of all seen task types.
```

```python
tasks_by_timestamp (limit=None)
    Get tasks by timestamp.
    Returns a list of (uuid, task) tuples.
```

```python
tasks_by_type (name, limit=None)
    Get all tasks by type.
    Returns a list of (uuid, task) tuples.
```

```python
tasks_by_worker (hostname, limit=None)
    Get all tasks by worker.
    Returns a list of (uuid, task) tuples.
```

```python
worker_event (type, fields)
    Process worker event.
```

```python
class celery.events.state.Task (**fields)
    Task State.
```

```python
info (fields=None, extra=[])
    Information about this task suitable for on-screen display.
```

```python
merge (state, timestamp, fields)
    Merge with out of order event.
```

```python
merge_rules = {'RECEIVED': ('name', 'args', 'kwargs', 'retries', 'eta', 'expires')}
    How to merge out of order events. Disorder is detected by logical ordering (e.g. task-received must have happened before a task-failed event).

    A merge rule consists of a state and a list of fields to keep from that state. (RECEIVED, ("name", "args"), means the name and args fields are always taken from the RECEIVED state, and any values for these fields received before or after is simply ignored.
```

```python
on_failed (timestamp=None, **fields)
    Callback for the task-failed event.
```

```python
on_received (timestamp=None, **fields)
    Callback for the task-received event.
```

```python
on_retried (timestamp=None, **fields)
    Callback for the task-retried event.
```

```python
on_revoked (timestamp=None, **fields)
    Callback for the task-revoked event.
```

```python
on_sent (timestamp=None, **fields)
    Callback for the task-sent event.
```

```python
on_started (timestamp=None, **fields)
    Callback for the task-started event.
```

```python
on_succeeded (timestamp=None, **fields)
    Callback for the task-succeeded event.
```

```python
ready
```
update(state, timestamp, fields)
    Update state from new event.

    Parameters
    * state – State from event.
    * timestamp – Timestamp from event.
    * fields – Event data.

class celery.events.state.Worker(**fields)
    Worker State.

    alive

    heartbeat_max = 4

    on_heartbeat(timestamp=None, **kwargs)
        Callback for the worker-heartbeat event.

    on_offline(**kwargs)
        Callback for the worker-offline event.

    on_online(timestamp=None, **kwargs)
        Callback for the worker-online event.

10.25 celery.apps.worker

class celery.apps.worker.Worker(concurrency=None, loglevel=None, logfile=None, hostname=None, discard=False, run_clockservice=False, schedule=None, task_time_limit=None, task_soft_time_limit=None, max_tasks_per_child=None, queues=None, events=False, db=None, include=None, app=None, pidfile=None, redirect_stdouts=None, redirect_stdouts_level=None, autoscale=None, scheduler_cls=None, pool=None, **kwargs)

class WorkController(concurrency=None, logfile=None, loglevel=None, send_events=None, hostname=None, ready_callback=<function noop at 0x1d9e398>, embed_clockservice=False, pool_cls=None, consumer_cls=None, mediator_cls=None, eta_scheduler_cls=None, schedule_filename=None, task_time_limit=None, task_soft_time_limit=None, max_tasks_per_child=None, pool_putlocks=None, db=None, pool_putlocks=None, prefetch_multiplier=None, eta_scheduler_precision=None, disable_rate_limits=None, autoscale=None, autoscaler_cls=None, scheduler_cls=None, app=None)

Unmanaged worker instance.

CLOSE = 2
RUN = 1
TERMINATE = 3
concurrency = None
consumer = None
embed_clockservice = None
logfile = None
logger = None
loglevel = 40
mediator = None
on_timer_error (exc_info)
on_timer_tick (delay)
pool = None
process_task (request)
    Process task by sending it to the pool of workers.
ready_queue = None
send_events = False
start ()
    Starts the workers main loop.
stop (in_sighandler=False)
    Graceful shutdown of the worker server.
terminate (in_sighandler=False)
    Not so graceful shutdown of the worker server.
Worker. die (msg, exitcode=1)
Worker. extra_info ()
Worker. init_loader ()
Worker. init_queues ()
Worker. install_platform_tweaks (worker)
    Install platform specific tweaks and workarounds.
Worker. on_consumer_ready (consumer)
Worker. osx_proxy_detection_workaround ()
    See http://github.com/ask/celery/issues#issue/161
Worker. purge_messages ()
Worker. redirect_stdouts_to_logger ()
Worker. run ()
Worker. run_worker ()
Worker. set_process_status (info)
Worker. startup_info ()
Worker. tasklist (include_builtins=True)
Worker. worker_init ()
celery.apps.worker.cpu_count ()
celery.apps.worker.install_HUP_not_supported_handler (worker)
celery.apps.worker.install_cry_handler (logger)
celery.apps.worker.install_rdb_handler ()
celery.apps.worker.install_worker_int_again_handler (worker)
celery.apps.worker.\texttt{install_worker_int_handler}(\texttt{worker})
celery.apps.worker.\texttt{install_worker_restart_handler}(\texttt{worker})
celery.apps.worker.\texttt{install_worker_term_handler}(\texttt{worker})

\section*{10.26 \texttt{celery.apps.beat}}

\texttt{class \texttt{celery.apps.beat.Beat}(\texttt{loglevel=None, logfile=None, schedule=None, max_interval=None, scheduler_cls=None, app=None, socket_timeout=30, redirect_stdout=None, redirect_stderr=None, pidfile=None, **kwargs})}

class \texttt{Service}(\texttt{logger=None, max_interval=None, schedule_filename=None, scheduler_cls=None, app=None})

\begin{itemize}
\item \texttt{get_scheduler(lazy=False)}
\item \texttt{scheduler}
\item \texttt{scheduler_cls}
\hspace{1em} alias of \texttt{PersistentScheduler}
\item \texttt{start(\texttt{embedded_process=False})}
\item \texttt{stop(\texttt{wait=False})}
\item \texttt{sync()}
\end{itemize}

\texttt{Beat.\texttt{init_loader}()}  

\texttt{Beat.\texttt{install_sync_handler}(\texttt{beat})}

Install a \texttt{SIGTERM} + \texttt{SIGINT} handler that saves the celerybeat schedule.

\texttt{Beat.\texttt{run}()}

\texttt{Beat.\texttt{set_process_title}()}  

\texttt{Beat.\texttt{setup_logging}()}

\texttt{Beat.\texttt{start_scheduler}(\texttt{logger=None})}

\texttt{Beat.\texttt{startup_info}(\texttt{beat})}

\section*{10.27 \texttt{celery.bin.base}}

\texttt{class \texttt{celery.bin.base.Command}(\texttt{app=None, get_app=None})}

\texttt{Base class for command line applications.}

\texttt{Parameters}

\begin{itemize}
\item \texttt{app} – The current app.
\item \texttt{get_app} – Callable returning the current app if no app provided.
\end{itemize}

\texttt{Parser}

\hspace{1em} alias of \texttt{OptionParser}

\texttt{args = ''}

\hspace{1em} Arg list used in help.
create_parser\( (prog\_name) \)

enable_config_from_cmdline = False
   Enable if the application should support config from the cmdline.

execute_from_commandline\( (argv=None) \)
   Execute application from command line.

   Parameters\n   \( argv \) – The list of command line arguments. Defaults to \( \text{sys.argv} \).

get_cls_by_name\( (name) \)

get_options()
   Get supported command line options.

handle_argv\( (prog\_name, argv) \)
   Parses command line arguments from \( argv \) and dispatches to \( \text{run()} \).

   Parameters
   \begin{itemize}
   \item \( prog\_name \) – The program name (\( argv[0] \)).
   \item \( argv \) – Command arguments.
   \end{itemize}

   Exits with an error message if \( \text{supports\_args} \) is disabled and \( argv \) contains positional arguments.

namespace = ‘celery’
   Default configuration namespace.

option_list = ()
   List of options (without preload options).

parse_options\( (prog\_name, arguments) \)
   Parse the available options.

parse_preload_options\( (args) \)
   List of options to parse before parsing other options.

process_cmdline_config\( (argv) \)

run\( (*args, **options) \)
   This is the body of the command called by \( \text{handle\_argv()} \).

setup_app_from_commandline\( (argv) \)

supports_args = True
   If false the parser will raise an exception if positional args are provided.

usage()
   Returns the command-line usage string for this app.

version = ‘2.2.10’
   Application version.

celery.bin.base.daemon_options\( (default\_pidfile, default\_logfile=None) \)

10.28 celery.bin.celeryd

celeryd

\(-c, \ --concurrency\)
   Number of child processes processing the queue. The default is the number of CPUs available on your system.
-f, --logfile
Path to log file. If no logfile is specified, stderr is used.

-l, --loglevel
Logging level, choose between DEBUG, INFO, WARNING, ERROR, CRITICAL, or FATAL.

-n, --hostname
Set custom hostname.

-B, --beat
Also run the celerybeat periodic task scheduler. Please note that there must only be one instance of this service.

-Q, --queues
List of queues to enable for this worker, separated by comma. By default all configured queues are enabled. Example: -Q video,image

-I, --include
Comma separated list of additional modules to import. Example: -I foo.tasks,bar.tasks

-s, --schedule
Path to the schedule database if running with the -B option. Defaults to celerybeat-schedule. The extension ".db" will be appended to the filename.

--scheduler
Scheduler class to use. Default is celery.beat.PersistentScheduler

-E, --events
Send events that can be captured by monitors like celerymon.

--purge, --discard
Discard all waiting tasks before the daemon is started. WARNING: This is unrecoverable, and the tasks will be deleted from the messaging server.

--time-limit
Enables a hard time limit (in seconds) for tasks.

--soft-time-limit
Enables a soft time limit (in seconds) for tasks.

--maxtasksperchild
Maximum number of tasks a pool worker can execute before it’s terminated and replaced by a new worker.

class celery.bin.celeryd.WorkerCommand(app=None, get_app=None):

    enable_config_from_cmdline = True
    get_options()
    namespace = ‘celeryd’
    run(*args, **kwargs)
    supports_args = False

    celery.bin.celeryd.main()
    celery.bin.celeryd.windows_main()

10.29 celery.bin.celerybeat

celerybeat
-s, --schedule
Path to the schedule database. Defaults to celerybeat-schedule. The extension ".db" will be appended to the filename.

-S, --scheduler
Scheduler class to use. Default is celery.beat.PersistentScheduler

-f, --logfile
Path to log file. If no logfile is specified, stderr is used.

-l, --loglevel
Logging level, choose between DEBUG, INFO, WARNING, ERROR, CRITICAL, or FATAL.

class celery.bin.celerybeat.BeatCommand(app=None, get_app=None)

get_options()
run(detach=False, logfile=None, pidfile=None, uid=None, gid=None, umask=None, working_directory=None, **kwargs)
supports_args = False

celery.bin.celerybeat.main()

10.30 celery.bin.celeryev

class celery.bin.celeryev.EvCommand(app=None, get_app=None)

get_options()
run(dump=False, camera=None, frequency=1.0, maxrate=None, loglevel='INFO', logfile=None, prog_name='celeryev', pidfile=None, uid=None, gid=None, umask=None, working_directory=None, **kwargs)
run_evcam(camera, logfile=None, pidfile=None, uid=None, gid=None, umask=None, working_directory=None, detach=False, **kwargs)
run_evdump()
run_evtop()
set_process_status(prog, info='')
supports_args = False

celery.bin.celeryev.main()

10.31 celeryctl - celery.bin.celeryctl

class celery.bin.celeryctl.Command(app=None, no_color=False)

args = ''
create_parser(prog_name, command)
error(s)
help = ''
option_list = (<Option at 0x5578128: –app>, <Option at 0x5578f80: –loader>, <Option at 0x422aef0: –config>, <Option at 0x6759d40: -q/–quiet>, <Option at 0x6759e18: -C/–no-color>)

out (s, fh=<open file ‘<stdout>’, mode ‘w’ at 0x7f488e128150>)

prettify(n)

prettify_dict_ok_error(n)

prettify_list(n)

run(*args, **kwargs)

run_from_argv(prog_name, argv)

usage(command)

version = ‘2.2.10’

exception celery.bin.celeryctl.Error
class celery.bin.celeryctl.apply (app=None, no_color=False)

args = ‘<task_name>’

option_list = (<Option at 0x5578128: –app>, <Option at 0x5578f80: –loader>, <Option at 0x422aef0: –config>, <Option at 0x6759d40: -q/–quiet>, <Option at 0x6759e18: -C/–no-color>, <Option at 0x675e758: -t/–timeout>, <Option at 0x675e7a0: -d/–destination>)

run(name, _, **kw)

class celery.bin.celeryctl.celeryctl (app=None, get_app=None)

commands = {'status': <class ‘celery.bin.celeryctl.status’>, ‘help’: <class ‘celery.bin.celeryctl.help’>, ‘inspect’: <class ‘celery.bin.celeryctl.inspect’>, ‘run_from_argv’: <class ‘celery.bin.celeryctl.run_from_argv’>, ‘result’: <class ‘celery.bin.celeryctl.result’>, ‘apply’: <class ‘celery.bin.celeryctl.apply’>}

execute(command, argv=None)

handle_argv(prog_name, argv)

celery.bin.celeryctl.command (fun)

class celery.bin.celeryctl.help (app=None, no_color=False)

run(*args, **kwargs)

usage(command)

celery.bin.celeryctl.indent (s, n=4)

class celery.bin.celeryctl.inspect (app=None, no_color=False)

choices = {'scheduled': 1.0, ‘reserved’: 1.0, ‘active’: 1.0, ‘cancel_consumer’: 1.0, ‘active_queues’: 1.0, ‘add_consumer’: 1.0, ‘registered_tasks’: 1.0, ‘stats’: 1.0, ‘revoked’: 1.0, ‘enable_events’: 1.0, ‘ping’: 0.2, ‘disable_events’: 1.0}

option_list = (<Option at 0x5578128: –app>, <Option at 0x5578f80: –loader>, <Option at 0x422aef0: –config>, <Option at 0x6759d40: -q/–quiet>, <Option at 0x6759e18: -C/–no-color>)

run(*args, **kwargs)

say(direction, title, body='')

usage(command)

celery.bin.celeryctl.main()

celery.bin.celeryctl.pluralize (n, text, suffix='s')

class celery.bin.celeryctl.purge (app=None, no_color=False)

run(*args, **kwargs)
class celery.bin.celeryctl.result(app=None, no_color=False)

    args = '<task_id>'
    option_list = ([Option at 0x5578128: –app>, <Option at 0x5578f80: –loader>, <Option at 0x422aef0: –config>, <Option at 0x6759d40: -q/–quiet>, <Option at 0x6759e18: -C/–no-color>]
    run(task_id, *args, **kwargs)

class celery.bin.celeryctl.status(app=None, no_color=False)

    option_list = ([Option at 0x5578128: –app>, <Option at 0x5578f80: –loader>, <Option at 0x422aef0: –config>, <Option at 0x6759d40: -q/–quiet>, <Option at 0x6759e18: -C/–no-color>, <Option at 0x675e758: -t/–timeout>, <Option at 0x675e7a0: -d/–destination>]
    run(*args, **kwargs)

10.32 celery.bin.camqadm

camqadm

class celery.bin.camqadm.AMQPAdmin(*args, **kwargs)
    The celery camqadm utility.
    connect(conn=None)
    run()
    say(m)

class celery.bin.camqadm.AMQPAdminCommand(app=None, get_app=None)

    run(*args, **options)

class celery.bin.camqadm.AMQShell(*args, **kwargs)
    AMQP API Shell.

    Parameters
    • connect – Function used to connect to the server, must return connection object.
    • silent – If True, the commands won’t have annoying output not relevant when running in
      non-shell mode.

    amqp
        Mapping of AMQP API commands and their Spec.
        amqp = {'queue.declare': <celery.bin.camqadm.Spec object at 0x4f6eed0>, 'queue.purge': <celery.bin.camqadm.Spec object at 0x4f6f5a0>
        builtins = {'exit': 'do_exit', 'EOF': 'do_exit', 'help': 'do_help'}
        chan = None
        completenames(text, *ignored)
            Return all commands starting with text, for tab-completion.
        conn = None
        counter = 1
        default(line)
**dispatch**(cmd, argline)
Dispatch and execute the command.

Lookup order is: `builtins -> amqp`.

**display_command_help**(cmd, short=False)

**do_exit**(args)
The “exit” command.

**do_help**(args)

**get_amqp_api_command**(cmd, arglist)
With a command name and a list of arguments, convert the arguments to Python values and find the corresponding method on the AMQP channel object.

**Returns** tuple of `(method, processed_args)`.

Example:

```python
>>> get_amqp_api_command("queue.delete", ["pobox", "yes", "no"])
(<bound method Channel.queue_delete of
 <amqplib.client_0_8.channel.Channel object at 0x...>>,
 ('testfoo', True, False))
```

**get_names**()

**identchars** = '.'

**inc_counter** = `<method-wrapper 'next' of itertools.count object at 0x50b33f8>`

**needs_reconnect** = False

**onecmd**(line)
Parse line and execute command.

**parseline**(line)
Parse input line.

**Returns** tuple of three items: `(command_name, arglist, original_line)`

E.g:

```python
>>> parseline("queue.delete A ‘B’ C")
("queue.delete", "A ‘B’ C", "queue.delete A ‘B’ C")
```

**prompt**

**prompt_fmt** = '%d> '

**respond**(retval)
What to do with the return value of a command.

**say**(m)
Say something to the user. Disabled if silent.

**class** celery.bin.camqadm.Spec(*args, **kwargs)
AMQP Command specification.

Used to convert arguments to Python values and display various help and tooltips.

**Parameters**

- `args` – see args.
- `returns` – see returns.
coerce(index, value)

Coerce value for argument at index.

E.g. if args is ["is_active", bool]:

```python
>>> coerce(0, "False")
False
```

format_arg(name, type, default_value=None)

format_response(response)

Format the return value of this command in a human-friendly way.

format_signature()

str_args_to_python(arglist)

Process list of string arguments to values according to spec.

e.g:

```python
>>> spec = Spec(["queue", str], ["if_unused", bool])
>>> spec.str_args_to_python("pobox", "true")
("pobox", True)
```

celery.bin.camqadm.camqadm(*args, **options)
celery.bin.camqadm.dump_message(message)
celery.bin.camqadm.format_declare_queue(ret)
celery.bin.camqadm.main()
celery.bin.camqadm.say(m)

10.33 celery.bin.celeryd_multi

- Examples

10.33.1 Examples

# Single worker with explicit name and events enabled.
$ celeryd-multi start Leslie -E

# Pidfiles and logfiles are stored in the current directory
# by default. Use --pidfile and --logfile argument to change
# this. The abbreviation %n will be expanded to the current
# node name.
$ celeryd-multi start Leslie -E --pidfile=/var/run/celery/%n.pid
   --logfile=/var/log/celery/%n.log

# You need to add the same arguments when you restart,
# as these are not persisted anywhere.
$ celeryd-multi restart Leslie -E --pidfile=/var/run/celery/%n.pid
   --logfile=/var/run/celery/%n.log

# To stop the node, you need to specify the same pidfile.
$ celeryd-multi stop Leslie --pidfile=/var/run/celery/%n.pid

# 3 workers, with 3 processes each
$ celeryd-multi start 3 -c 3
celeryd -n celeryd1.myhost -c 3
celeryd -n celeryd2.myhost -c 3
celeryd -n celeryd3.myhost -c 3

# start 3 named workers
$ celeryd-multi start image video data -c 3
celeryd -n image.myhost -c 3
celeryd -n video.myhost -c 3
celeryd -n data.myhost -c 3

# specify custom hostname
$ celeryd-multi start 2 -n worker.example.com -c 3
celeryd -n celeryd1.worker.example.com -c 3
celeryd -n celeryd2.worker.example.com -c 3

# Advanced example starting 10 workers in the background:
# * Three of the workers processes the images and video queue
# * Two of the workers processes the data queue with loglevel DEBUG
# * the rest processes the default’ queue.
$ celeryd-multi start 10 -l INFO -Q:1-3 images,video -Q:4,5:data
   -Q default -L:4,5 DEBUG

# You can show the commands necessary to start the workers with
# the "show" command:
$ celeryd-multi show 10 -l INFO -Q:1-3 images,video -Q:4,5:data
   -Q default -L:4,5 DEBUG

# Additional options are added to each celeryd’,
# but you can also modify the options for ranges of, or specific workers

# 3 workers: Two with 3 processes, and one with 10 processes.
$ celeryd-multi start 3 -c 3 -c:1 10
celeryd -n celeryd1.myhost -c 10
celeryd -n celeryd2.myhost -c 3
celeryd -n celeryd3.myhost -c 3

# can also specify options for named workers
$ celeryd-multi start image video data -c 3 -c:image 10
celeryd -n image.myhost -c 10
celeryd -n video.myhost -c 3
celeryd -n data.myhost -c 3

# ranges and lists of workers in options is also allowed:
# (-c:1-3 can also be written as -c:1,2,3)
$ celeryd-multi start 5 -c 3 -c:1-3 10
celeryd -n celeryd1.myhost -c 10
celeryd -n celeryd2.myhost -c 10
celeryd -n celeryd3.myhost -c 10
celeryd -n celeryd4.myhost -c 3
celeryd -n celeryd5.myhost -c 3

# lists also works with named workers
$ celeryd-multi start foo bar baz xuzzy -c 3 -c:foo,bar,baz 10
celeryd -n foo.myhost -c 10
celeryd -n bar.myhost -c 10
celeryd -n baz.myhost -c 10
celeryd -n xuzzy.myhost -c 3

```python
class celery.bin.celeryd_multi.MultiTool

    error (msg=None)
    execute_from_commandline (argv, cmd='celeryd')
    expand (argv, cmd=None)
    get (argv, cmd)
    getpids (p, cmd, callback=None)
    help (argv, cmd=None)
    info (msg, newline=True)
    kill (argv, cmd)
    names (argv, cmd)
    node_alive (pid)
    note (msg, newline=True)
    restart (argv, cmd)
    retcode = 0
    show (argv, cmd)
    shutdown_nodes (nodes, sig=15, retry=None, callback=None)
    signal_node (nodename, pid, sig)
    splash()
    start (argv, cmd)
    stop (argv, cmd)
    usage()
    waitexec (argv, path='/home/docs/checkouts/readthedocs.org/user_builds/celery/envs/2.2-archived/bin/python')
    with_detacher_default_options (p)

class celery.bin.celeryd_multi.NamespacedOptionParser (args)

    add_option (name, value, short=False, ns=None)
    optmerge (ns, defaults=None)
    parse()
    process_long_opt (arg, value=None)
    process_short_opt (arg, value=None)
```

```python
celery.bin.celeryd_multiabbreviations (map)
```
celery.bin.celeryd_multi.main()
celery.bin.celeryd_multi.multi_args(p, cmd='celeryd', append='; prefix='; suffix='')
celery.bin.celeryd_multi.parse_ns_range(ns, ranges=False)
celery.bin.celeryd_multi.quote(v)
celery.bin.celeryd_multi.say(m, newline=True)
11.1 Celery Deprecation Timeline

11.1.1 Removals for version 2.0

- The following settings will be removed:

<table>
<thead>
<tr>
<th>Setting name</th>
<th>Replace with</th>
</tr>
</thead>
<tbody>
<tr>
<td>CELERY_AMQP_CONSUMER_QUEUES</td>
<td>CELERY_QUEUES</td>
</tr>
<tr>
<td>CELERY_AMQP_CONSUMER_QUEUES</td>
<td>CELERY_QUEUES</td>
</tr>
<tr>
<td>CELERY_AMQP_EXCHANGE</td>
<td>CELERY_DEFAULT_EXCHANGE</td>
</tr>
<tr>
<td>CELERY_AMQP_EXCHANGE_TYPE</td>
<td>CELERY_DEFAULT_AMQP_EXCHANGE_TYPE</td>
</tr>
<tr>
<td>CELERY_AMQP_CONSUMER_ROUTING_KEY</td>
<td>CELERY_QUEUES</td>
</tr>
<tr>
<td>CELERY_AMQP_PUBLISHER_ROUTING_KEY</td>
<td>CELERY_DEFAULT_ROUTING_KEY</td>
</tr>
</tbody>
</table>

- CELERY_LOADER definitions without class name.
  E.g. celery.loaders.default, needs to include the class name: celery.loaders.default.Loader.

- TaskSet.run(). Use celery.task.base.TaskSet.apply_async() instead.

- The module celery.task.rest; use celery.task.http instead.

11.2 Internals: The worker
11.2.1 Introduction

The worker consists of 4 main components: the consumer, the scheduler, the mediator and the task pool. All these components run in parallel working with two data structures: the ready queue and the ETA schedule.

11.2.2 Data structures

**ready_queue**

The ready queue is either an instance of `Queue.Queue`, or `celery.buckets.TaskBucket`. The latter if rate limiting is enabled.

**eta_schedule**

The ETA schedule is a heap queue sorted by time.

11.2.3 Components

**Consumer**

Receives messages from the broker using Kombu.

When a message is received it’s converted into a `celery.worker.job.TaskRequest` object.

Tasks with an ETA are entered into the `eta_schedule`, messages that can be immediately processed are moved directly to the `ready_queue`.

**ScheduleController**

The schedule controller is running the `eta_schedule`. If the scheduled tasks eta has passed it is moved to the `ready_queue`, otherwise the thread sleeps until the eta is met (remember that the schedule is sorted by time).

**Mediator**

The mediator simply moves tasks in the `ready_queue` over to the task pool for execution using `celery.worker.job.TaskRequest.execute_using_pool()`.
TaskPool

This is a slightly modified `multiprocessing.Pool`. It mostly works the same way, except it makes sure all of the workers are running at all times. If a worker is missing, it replaces it with a new one.

11.3 Task Message Protocol

- Message format
- Example message
- Serialization

11.3.1 Message format

- **task** *string*
  
  Name of the task. **required**

- **id** *string*
  
  Unique id of the task (UUID). **required**

- **args** *list*
  
  List of arguments. Will be an empty list if not provided.

- **kwargs** *dictionary*
  
  Dictionary of keyword arguments. Will be an empty dictionary if not provided.

- **retries** *int*
  
  Current number of times this task has been retried. Defaults to 0 if not specified.

- **eta** *string (ISO 8601)*
  
  Estimated time of arrival. This is the date and time in ISO 8601 format. If not provided the message is not scheduled, but will be executed asap.

- **expires (introduced after v2.0.2)** *string (ISO 8601)*
  
  Expiration date. This is the date and time in ISO 8601 format. If not provided the message will never expire. The message will be expired when the message is received and the expiration date has been exceeded.

11.3.2 Example message

This is an example invocation of the `celery.task.PingTask` task in JSON format:

```json
{"id": "4cc7438e-afd4-4f8f-a2f3-f46567e7ca77",
 "task": "celery.task.PingTask",
 "args": [],
 "kwargs": {},
 "retries": 0,
 "eta": "2009-11-17T12:30:56.527191"}
```
11.3.3 Serialization

The protocol supports several serialization formats using the `content_type` message header.

The MIME-types supported by default are shown in the following table.

<table>
<thead>
<tr>
<th>Scheme</th>
<th>MIME Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>json</td>
<td>application/json</td>
</tr>
<tr>
<td>yaml</td>
<td>application/x-yaml</td>
</tr>
<tr>
<td>pickle</td>
<td>application/x-python-serialize</td>
</tr>
<tr>
<td>msgpack</td>
<td>application/x-msgpack</td>
</tr>
</tbody>
</table>

11.4 “The Big Instance” Refactor

The app branch is a work-in-progress to remove the use of a global configuration in Celery.

Celery can now be instantiated, which means several instances of Celery may exist in the same process space. Also, large parts can be customized without resorting to monkey patching.

11.4.1 Examples

Creating a Celery instance:

```python
>>> from celery import Celery
>>> celery = Celery()
>>> celery.config_from_object("celeryconfig")
>>> celery.config.from_envvar("CELERY_CONFIG_MODULE")
```

Creating tasks:

```python
@celery.task()
def add(x, y):
    return x + y
```

Creating custom Task subclasses:

```python
class DebugTask(Task):
    abstract = True

    def on_failure(self, *args, **kwargs):
        import pdb
        pdb.set_trace()
```

```python
@celery.task(base=DebugTask)
def add(x, y):
    return x + y
```

Starting a worker:

```python
worker = celery.Worker(loglevel="INFO")
```

Getting access to the configuration:

```python
celery.conf.CELERY_ALWAYS_EAGER = True
```

```python
celery.conf["CELERY_ALWAYS_EAGER"] = True
```
Controlling workers:

>>> celery.control.inspect().active()
>>> celery.control.rate_limit(add.name, "100/m")
>>> celery.control.broadcast("shutdown")
>>> celery.control.discard_all()

Other interesting attributes:

# Establish broker connection.
>>> celery.broker_connection()

# AMQP Specific features.
>>> celery.amqp
>>> celery.amqp.Router
>>> celery.amqp.get_queues()
>>> celery.amqp.get_task_consumer()

# Loader
>>> celery.loader

# Default backend
>>> celery.backend

As you can probably see, this really opens up another dimension of customization abilities.

11.4.2 Deprecations

- celery.task.ping celery.task.PingTask
  Inferior to the ping remote control command. Will be removed in Celery 2.3.

11.4.3 Removed deprecations

- celery.utils.timedelta_seconds Use: celery.utils.timeutils.timedelta_seconds()
- celery.utils.defaultdict Use: celery.utils.compat.defaultdict()
- celery.utils.all Use: celery.utils.compat.all()
- celery.task.apply_async Use app.send_task
- celery.task.tasks Use celery.registry.tasks

11.4.4 Aliases (Pending deprecation)

- celery.task.base
  - .Task -> {app.create_task_cls}
- celery.task.sets
  - .TaskSet -> {app.TaskSet}
- celery.decorators / celery.task
  - .task -> {app.task}
- celery.execute
• celery.log
  – .get_default_logger -> {app.log.get_default_logger}
  – .setup_logger -> {app.log.setup_logger}
  – .get_task_logger -> {app.log.get_task_logger}
  – .setup_task_logger -> {app.log.setup_task_logger}
  – .setup_logging_subsystem -> {app.log.setup_logging_subsystem}
  – .redirect_stdouts_to_logger -> {app.log.redirect_stdouts_to_logger}

• celery.messaging
  – .establish_connection -> {app.broker_connection}
  – .with_connection -> {app.with_connection}
  – .get_consumer_set -> {app.amqp.get_task_consumer}
  – .TaskPublisher -> {app.amqp.TaskPublisher}
  – .TaskConsumer -> {app.amqp.TaskConsumer}
  – .ConsumerSet -> {app.amqp.ConsumerSet}

• celery.conf.* -> {app.conf}

  NOTE: All configuration keys are now named the same as in the configuration. So the key “CELERY_ALWAYS_EAGER” is accessed as:

  >>> app.conf.CELERY_ALWAYS_EAGER

  instead of:

  >>> from celery import conf
  >>> conf.ALWAYS_EAGER

  – .get_queues -> {app.amqp.get_queues}

• celery.task.control
  – .broadcast -> {app.control.broadcast}
  – .rate_limit -> {app.control.rate_limit}
  – .ping -> {app.control.ping}
  – .revoke -> {app.control.revoke}
  – .discard_all -> {app.control.discard_all}
  – .inspect -> {app.control.inspect}

• celery.utils.info
  – .humanize_seconds -> celery.utils.timeutils.humanize_seconds
  – .textindent -> celery.utils.textindent
11.4.5 Default App Usage

To be backward compatible, it must be possible to use all the classes/functions without passing an explicit app instance. This is achieved by having all app-dependent objects use `default_app` if the app instance is missing.

```python
from celery.app import app_or_default

class SomeClass(object):
    def __init__(self, app=None):
        self.app = app_or_default(app)
```

The problem with this approach is that there is a chance that the app instance is lost along the way, and everything seems to be working normally. Testing app instance leaks is hard. The environment variable `CELERY_TRACE_APP` can be used, when this is enabled `celery.app.app_or_default()` will raise an exception whenever it has to go back to the default app instance.

App Dependency Tree

- `{app}`
  - `celery.loaders.base.BaseLoader`
  - `celery.backends.base.BaseBackend`
  - `{app.TaskSet}`
    * `celery.task.sets.TaskSet (app.TaskSet)`
  - `[app.TaskSetResult]`
    * `celery.result.TaskSetResult (app.TaskSetResult)`
- `{app.AsyncResult}`
  - `celery.result.BaseAsyncResult / celery.result.AsyncResult`
- `celery.bin.celeryd.WorkerCommand`
  - `celery.apps.worker.Worker`
    * `celery.worker.WorkerController`
      - `celery.worker.consumer.Consumer`
        - `celery.worker.job.TaskRequest`
        - `celery.events.EventDispatcher`
      - `celery.worker.control.ControlDispatch`
        - `celery.woker.control.registry.Panel`
        - `celery.pidbox.BroadcastPublisher`
        - `celery.pidbox.BroadcastConsumer`
11.5 Internal Module Reference

Release 2.2
Date February 04, 2014

11.5.1 celery.worker

celery.worker.WORKER_SIGIGNORE = frozenset(['SIGINT'])
List of signals to ignore when a child process starts.

celery.worker.WORKER_SIGRESET = frozenset(['SIGHUP', 'SIGTERM', 'SIGTTOU', 'SIGTTIN', 'SIGUSR1'])
List of signals to reset when a child process starts.

class celery.worker.WorkController (concurrency=None, logfile=None, loglevel=None, send_events=None, ready_callback=<function noop at 0x1d9e398>, embed_clockservice=False, pool_cls=None, mediator_cls=None, eta_scheduler_cls=None, schedule_filename=None, task_time_limit=None, task_soft_time_limit=None, max_tasks_per_child=None, pool_putlocks=None, db=None, prefetch_multiplier=None, eta_scheduler_precision=None, disable_rate_limits=None, autoscale=None, autoscaler_cls=None, scheduler_cls=None, app=None)

Unmanaged worker instance.
CLOSE = 2
RUN = 1
TERMINATE = 3

**concurrency = None**
- The number of simultaneous processes doing work (default: `CELDYD_CONCURRENCY`)

**consumer = None**
- Consumer instance.

**embed_clockservice = None**
- If True, celerybeat is embedded, running in the main worker process as a thread.

**logfile = None**
- The logfile used, if no logfile is specified it uses `stderr` (default: `CELDYD_LOG_FILE`).

**logger = None**
- The `logging.Logger` instance used for logging.

**loglevel = 40**
- The loglevel used (default: `logging.INFO`)

**mediator = None**
- Instance of `celery.worker.mediator.Mediator`.

**on_timer_error** *(exc_info)*

**on_timer_tick** *(delay)*

**pool = None**
- The pool instance used.

**process_task** *(request)*
- Process task by sending it to the pool of workers.

**ready_queue = None**
- The internal queue object that holds tasks ready for immediate processing.

**send_events = False**
- Enable the sending of monitoring events, these events can be captured by monitors (celerymon).

**start** *
- Starts the workers main loop.

**stop**(in_sighandler=False)
- Graceful shutdown of the worker server.

**terminate**(in_sighandler=False)
- Not so graceful shutdown of the worker server.

`celery.worker.process_initializer` *(app, hostname)*
- Initializes the process so it can be used to process tasks.
- Used for multiprocessing environments.

### 11.5.2 celery.worker.consumer

This module contains the component responsible for consuming messages from the broker, processing the messages and keeping the broker connections up and running.
• **start()** is an infinite loop, which only iterates again if the connection is lost. For each iteration (at start, or if the connection is lost) it calls **reset_connection()**, and starts the consumer by calling **consume_messages()**.

• **reset_connection()**, clears the internal queues, establishes a new connection to the broker, sets up the task consumer (+ QoS), and the broadcast remote control command consumer.

Also if events are enabled it configures the event dispatcher and starts up the heartbeat thread.

• Finally it can consume messages. **consume_messages()** is simply an infinite loop waiting for events on the AMQP channels.

Both the task consumer and the broadcast consumer uses the same callback: **receive_message()**.

• So for each message received the **receive_message()** method is called, this checks the payload of the message for either a **task** key or a **control** key.

If the message is a task, it verifies the validity of the message converts it to a **celery.worker.job.TaskRequest**, and sends it to **on_task()**.

If the message is a control command the message is passed to **on_control()**, which in turn dispatches the control command using the control dispatcher.

It also tries to handle malformed or invalid messages properly, so the worker doesn’t choke on them and die. Any invalid messages are acknowledged immediately and logged, so the message is not resent again, and again.

• If the task has an ETA/countdown, the task is moved to the **eta_schedule** so the **timer2.Timer** can schedule it at its deadline. Tasks without an eta are moved immediately to the **ready_queue**, so they can be picked up by the **Mediator** to be sent to the pool.

• When a task with an ETA is received the QoS prefetch count is also incremented, so another message can be reserved. When the ETA is met the prefetch count is decremented again, though this cannot happen immediately because amqplib doesn’t support doing broker requests across threads. Instead the current prefetch count is kept as a shared counter, so as soon as **consume_messages()** detects that the value has changed it will send out the actual QoS event to the broker.

• Notice that when the connection is lost all internal queues are cleared because we can no longer ack the messages reserved in memory. Hoever, this is not dangerous as the broker will resend them to another worker when the channel is closed.

• **WARNING**: **stop()** does not close the connection! This is because some pre-acked messages may be in processing, and they need to be finished before the channel is closed. For celeryd this means the pool must finish the tasks it has acked early, then close the connection.

class celery.worker.consumer.Consumer (ready_queue, eta_schedule, logger, init_callback=<function noop at 0x1d9e398>, send_events=False, hostname=None, initial_prefetch_count=2, pool=None, app=None, priority_timer=None)

Listen for messages received from the broker and move them the the ready queue for task processing.

**Parameters**

• **ready_queue** – See **ready_queue**.

• **eta_schedule** – See **eta_schedule**.

**ready_queue**

The queue that holds tasks ready for immediate processing.

**eta_schedule**

Scheduler for paused tasks. Reasons for being paused include a countdown/eta or that it’s waiting for retry.

**send_events**

Is events enabled?
init_callback
Callback to be called the first time the connection is active.

hostname
Current hostname. Defaults to the system hostname.

initial_prefetch_count
Initial QoS prefetch count for the task channel.

control_dispatch
Control command dispatcher. See celery.worker.control.ControlDispatch.

event_dispatcher
See celery.events.EventDispatcher.

hart
Heart sending out heartbeats if events enabled.

logger
The logger used.

apply_eta_task(task)

close_connection()

consume_messages()
Consume messages forever (or until an exception is raised).

info

maybe_conn_error(fun)

on_control(body, message)

on_decode_error(message, exc)
Callback called if the message had decoding errors.
Parameters
- message – The message with errors.
- exc – The original exception instance.

on_task(task)
Handle received task.

If the task has an eta we enter it into the ETA schedule, otherwise we move it the ready queue for immediate processing.

receive_message(body, message)
The callback called when a new message is received.

reset_connection()
Re-establish connection and set up consumers.

restart_pidbox_node()

restart_heartbeat()

start()
Start the consumer.

If the connection is lost, it tries to re-establish the connection and restarts consuming messages.

stop()
Stop consuming.

Does not close connection.
**stop_consumers** (*close=True*)
Stop consuming.

```python
celery.worker.consumer.PREFETCH_COUNT_MAX = 65535
```
Prefetch count can’t exceed short.

```python
class celery.worker.consumer.QoS(consumer, initial_value, logger)
```
Quality of Service for Channel.

For thread-safe increment/decrement of a channels prefetch count value.

Parameters

- **consumer** – A kombu.messaging.Consumer instance.
- **initial_value** – Initial prefetch count value.
- **logger** – Logger used to log debug messages.

```python
def decrement(n=1)
Decrement the current prefetch count value by one.
```

```python
def decrement_eventually(n=1)
Decrement the value, but do not update the qos.

The MainThread will be responsible for calling update() when necessary.
```

```python
def increment(n=1)
Increment the current prefetch count value by one.
```

```python
prev = None
```

```python
def set(pcount)
Set channel prefetch_count setting.
```

```python
def update()
Update prefetch count with current value.
```

### 11.5.3 celery.worker.job

```python
exception celery.worker.job.AlreadyExecutedError
Tasks can only be executed once, as they might change world-wide state.
```

```python
exception celery.worker.job.InvalidTaskError
The task has invalid data or is not properly constructed.
```

```python
celery.worker.job.TASK_ERROR_EMAIL_BODY = \nTask %(name)s with id %(id)s raised exception: %(exc)r


Task was called with args: %(args)s kwargs: %(kwargs)s.

The contents of the full traceback was:

%(traceback)s

– 
Just to let you know,
celeryd at %(hostname)s.
```

```python
class celery.worker.job.TaskRequest(task_name, task_id, args, kwargs, on_ack=<function noop at 0x1d9e398>, retries=0, delivery_info=None, hostname=None, email_subject=None, email_body=None, logger=None, eventer=None, eta=None, expires=None, app=None, taskset_id=None, **opts)
```
A request for task execution.

```python
acknowledge()
Acknowledge task.
```

```python
acknowledged = False
Flag set when the task has been acknowledged.
```

```python
args = None
List of positional arguments to apply to the task.
```
**delivery_info = None**

Additional delivery info, e.g. contains the path from Producer to consumer.

**email_body = 'nTask %(name)s with id %id)s raised exception: n%(exc)r

Task was called with args: %args) and kwargs: %kwargs)

The contents of the full traceback was:

%(traceback)

–

Just to let you know,
celeryd at %(hostname)s.

**email_subject = '[celery@%(hostname)s] Error: Task %(name)s (%(id)s): %(exc)s

**error_msg = 'Task %(name)s[%(id)s] raised exception: %(exc)r
%(traceback)

**eta = None

The tasks eta (for information only).

**execute (loglevel=None, logfile=None)**

Execute the task in a WorkerTaskTrace.

**Parameters**

- **loglevel** – The loglevel used by the task.
- **logfile** – The logfile used by the task.

**execute_using_pool (pool, loglevel=None, logfile=None)**

Like execute(), but using the multiprocessing pool.

**Parameters**

- **pool** – A multiprocessing.Pool instance.
- **loglevel** – The loglevel used by the task.
- **logfile** – The logfile used by the task.

**executed = False**

Flag set when the task has been executed.

**expires = None**

When the task expires.

**extend_with_default_kwargs (loglevel, logfile)**

Extend the tasks keyword arguments with standard task arguments.

Currently these are logfile, loglevel, task_id, task_name, task_retries, and delivery_info.

See celery.task.base.Task.run() for more information.

**classmethod from_message (message, body, on_ack=<function noop at 0x1d9e398>, **kw)**

Create request from a task message.

**Raises UnknownTaskError** if the message does not describe a task, the message is also rejected.

**get_instance_attr (loglevel, logfile)**

**info (safe=False)**

**kwarg = None**

Mapping of keyword arguments to apply to the task.

**maybe_expire ()**

If expired, mark the task as revoked.

**message = None**

The message object. Used to acknowledge the message.

**name = None**

Kind of task. Must be a name registered in the task registry.
on_accepted (pid, time_accepted)
   Handler called when task is accepted by worker pool.

on_ack = None
   Callback called when the task should be acknowledged.

on_failure (exc_info)
   Handler called if the task raised an exception.

on_retry (exc_info)
   Handler called if the task should be retried.

on_success (ret_value)
   Handler called if the task was successfully processed.

on_timeout (soft)
   Handler called if the task times out.

repr_result (result, maxlen=46)

retries = 0
   Number of times the task has been retried.

retry_msg = ‘Task %s retry: %s’
   Format string used to log task retry.

revoked ()
   If revoked, skip task and mark state.

send_error_email (task, context, exc, whitelist=None, enabled=False, fail_silently=True)

send_event (type, **fields)

shortinfo ()

success_msg = ‘Task %s succeeded in %ss: %s’
   Format string used to log task success.

task = None
   The task class (set by constructor using task_name).

task_id = None
   UUID of the task.

taskset_id = None
   UUID of the taskset that this task belongs to.

terminate (pool, signal=None)

time_start = None
   Timestamp set when the task is started.

worker_pid = None
   Process id of the worker processing this task (if any).

celery.worker.job.WANTED_DELIVERY_INFO = (‘exchange’, ‘routing_key’, ‘consumer_tag’)  
   Keys to keep from the message delivery info. The values of these keys must be pickleable.

class celery.worker.job.WorkerTaskTrace (*args, **kwargs)
   Wraps the task in a jail, catches all exceptions, and saves the status and result of the task execution to the task meta backend.

   If the call was successful, it saves the result to the task result backend, and sets the task status to “SUCCESS”.

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If the call raises `celery.exceptions.RetryTaskError`, it extracts the original exception, uses that as the result and sets the task status to “RETRY”. If the call results in an exception, it saves the exception as the task result, and sets the task status to “FAILURE”.

**Parameters**
- `task_name` – The name of the task to execute.
- `task_id` – The unique id of the task.
- `args` – List of positional args to pass on to the function.
- `kwargs` – Keyword arguments mapping to pass on to the function.
- `loader` – Custom loader to use, if not specified the current app loader will be used.
- `hostname` – Custom hostname to use, if not specified the system hostname will be used.

**Returns** the evaluated functions return value on success, or the exception instance on failure.

**execute**()
Execute, trace and store the result of the task.

**execute_safe**(*args, **kwargs)
Same as `execute()`, but catches errors.

**handle_failure**(exc, type_, tb, strtb)
Handle exception.

**handle_retry**(exc, type_, tb, strtb)
Handle retry exception.

**handle_success**(retval, *args)
Handle successful execution.

**hostname** = None
Hostname to report as.

**loader** = None
Current loader.

`celery.worker.job.execute_and_trace`(task_name, *args, **kwargs)
This is a pickleable method used as a target when applying to pools.

It’s the same as:

```python
>>> WorkerTaskTrace(task_name, *args, **kwargs).execute_safe()
```

### 11.5.4 `celery.worker.mediator`

Worker Controller Threads

**class** `celery.worker.mediator.Mediator`(ready_queue, callback, logger=None, app=None)
Thread continuously moving tasks from the ready queue into the pool.

**callback** = None
Callback called when a task is obtained.

**move**()

**ready_queue** = None
The task queue, a `Queue` instance.

**run**()
Move tasks forver or until `stop()` is called.

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stop()
Gracefully shutdown the thread.

11.5.5 celery.worker.buckets

class celery.worker.buckets.FastQueue(maxsize=0)
Queue.Queue supporting the interface of TokenBucketQueue.
clear()
expected_time(tokens=1)
items
wait(block=True)

exception celery.worker.buckets.RateLimitExceeded
The token buckets rate limit has been exceeded.
class celery.worker.buckets.TaskBucket(task_registry)
This is a collection of token buckets, each task type having its own token bucket. If the task type doesn’t have a rate limit, it will have a plain Queue object instead of a TokenBucketQueue.
The put() operation forwards the task to its appropriate bucket, while the get() operation iterates over the buckets and retrieves the first available item.
Say we have three types of tasks in the registry: celery.ping, feed.refresh and video.compress, the TaskBucket will consist of the following items:

{"celery.ping": TokenBucketQueue(fill_rate=300),
"feed.refresh": Queue(),
"video.compress": TokenBucketQueue(fill_rate=2)}

The get operation will iterate over these until one of the buckets is able to return an item. The underlying datastructure is a dict, so the order is ignored here.

Parameters task_registry – The task registry used to get the task type class for a given task name.

class celery.worker.buckets.TaskBucket(task_registry)
This is a collection of token buckets, each task type having its own token bucket. If the task type doesn’t have a rate limit, it will have a plain Queue object instead of a TokenBucketQueue.
The put() operation forwards the task to its appropriate bucket, while the get() operation iterates over the buckets and retrieves the first available item.
Say we have three types of tasks in the registry: celery.ping, feed.refresh and video.compress, the TaskBucket will consist of the following items:

{"celery.ping": TokenBucketQueue(fill_rate=300),
"feed.refresh": Queue(),
"video.compress": TokenBucketQueue(fill_rate=2)}

The get operation will iterate over these until one of the buckets is able to return an item. The underlying datastructure is a dict, so the order is ignored here.

Parameters task_registry – The task registry used to get the task type class for a given task name.

add_bucket_for_type(task_name)
Add a bucket for a task type.

Will read the tasks rate limit and create a TokenBucketQueue if it has one. If the task doesn’t have a rate limit FastQueue will be used instead.

clear()
Delete the data in all of the buckets.

empty()
Returns True if all of the buckets are empty.

get(block=True, timeout=None)
Retrive the task from the first available bucket.

Available as in, there is an item in the queue and you can consume tokens from it.

get_bucket_for_type(task_name)
Get the bucket for a particular task type.

get_nowait()

init_with_registry()
Initialize with buckets for all the task types in the registry.
items
Flattens the data in all of the buckets into a single list.

put(request)
Put a TaskRequest into the appropriate bucket.

put_nowait(request)
Put a TaskRequest into the appropriate bucket.

qsize()
Get the total size of all the queues.

refresh()
Refresh rate limits for all task types in the registry.

update_bucket_for_type(task_name)

class celery.worker.buckets.TokenBucketQueue(fill_rate, queue=None, capacity=1)
Queue with rate limited get operations.

This uses the token bucket algorithm to rate limit the queue on get operations.

Parameters
• fill_rate – The rate in tokens/second that the bucket will be refilled.
• capacity – Maximum number of tokens in the bucket. Default is 1.

exception RateLimitExceeded
The token buckets rate limit has been exceeded.

TokenBucketQueue.clear()
Delete all data in the queue.

TokenBucketQueue.empty()
Returns True if the queue is empty.

TokenBucketQueue.expected_time(tokens=1)
Returns the expected time in seconds of when a new token should be available.

TokenBucketQueue.get(block=True)
Remove and return an item from the queue.

Raises
• RateLimitExceeded – If a token could not be consumed from the token bucket (consuming from the queue too fast).
• Queue.Empty – If an item is not immediately available.

TokenBucketQueue.get_nowait()
Remove and return an item from the queue without blocking.

Raises
• RateLimitExceeded – If a token could not be consumed from the token bucket (consuming from the queue too fast).
• Queue.Empty – If an item is not immediately available.

TokenBucketQueue.items
Underlying data. Do not modify.

TokenBucketQueue.put(item, block=True)
Put an item onto the queue.

TokenBucketQueue.put_nowait(item)
Put an item into the queue without blocking.

Raises Queue.Full If a free slot is not immediately available.

TokenBucketQueue.qsize()
Returns the size of the queue.
TokenBucketQueue.wait(block=False)
Wait until a token can be retrieved from the bucket and return the next item.

celery.worker.buckets.chain_from_iterable()
chain.from_iterable(iterable) -> chain object
Alternate chain() constructor taking a single iterable argument that evaluates lazily.

11.5.6 celery.worker.heartbeat

class celery.worker.heartbeat.Heart (timer, eventer, interval=None)
Timer sending heartbeats at regular intervals.
Parameters
• timer – Timer instance.
• eventer – Event dispatcher used to send the event.
• interval – Time in seconds between heartbeats. Default is 2 minutes.
   bpm = 0.5
   Beats per minute.
   start()
   stop()

11.5.7 celery.worker.state

class celery.worker.state.Persistent (filename)

   close()
   db
   merge (d)
   open()
   save()
   storage = <module 'shelve' from '/usr/lib/python2.7/shelve.pyc'>
   sync (d)

   celery.worker.state.REVOKES_MAX = 10000
   maximum number of revokes to keep in memory.

   celery.worker.state.REVOKE_EXPIRES = 3600
   how many seconds a revoke will be active before being expired when the max limit has been exceeded.

   celery.worker.state.SOFTWARE_INFO = {'sw_sys': 'Linux', 'sw_ident': 'celeryd', 'sw_ver': '2.2.10'}
   Worker software/platform information.

   celery.worker.state.active_requests = set([])
   set of currently active TaskRequest's.

   celery.worker.state.reserved_requests = set([])
   set of all reserved TaskRequest's.

   celery.worker.state.revoked = LimitedSet([])
   the list of currently revoked tasks. Persistent if statedb set.
celery.worker.state.task_accepted(request)
    Updates global state when a task has been accepted.

celery.worker.state.task_ready(request)
    Updates global state when a task is ready.

celery.worker.state.task_reserved(request)
    Updates global state when a task has been reserved.

celery.worker.state.total_count = defaultdict(<function <lambda> at 0x5ca6050>, {})
    count of tasks executed by the worker, sorted by type.

11.5.8 celery.worker.autoscale

class celery.worker.autoscale.Autoscaler(pool, max_concurrency, min_concurrency=0,
    keepalive=30, logger=None)

    processes
    qty
    run()
    scale()
    scale_down(n)
    scale_up(n)
    stop()

11.5.9 celery.concurrency

celery.concurrency.get_implementation(cls)

11.5.10 celery.concurrency.solo

class celery.concurrency.solo.TaskPool(limit=None, putlocks=True, logger=None, **options)
    Solo task pool (blocking, inline).

    on_apply(target, args, kwargs, callback=None, accept_callback=None, **_)

    on_start()

11.5.11 celery.concurrency.processes

Process Pools.

class celery.concurrency.processes.TaskPool(limit=None, putlocks=True, logger=None,
    **options)

    Process Pool for processing tasks in parallel.

    Parameters
            • processes – see processes.
            • logger – see logger.

    limit
            The number of processes that can run simultaneously.
logger
The logger used for debugging.

class Pool (processes=None, initializer=None, initargs=(), maxtasksperchild=None, timeout=None, soft_timeout=None)
Class which supports an async version of the apply() builtin

class Process (group=None, target=None, name=None, args=(), kwargs={})
Process objects represent activity that is run in a separate process
The class is analagous to threading.Thread

authkey
daemon
    Return whether process is a daemon

exitcode
    Return exit code of process or None if it has yet to stop

ident
    Return identifier (PID) of process or None if it has yet to start

is_alive()
    Return whether process is alive

join (timeout=None)
    Wait until child process terminates

name

pid
    Return identifier (PID) of process or None if it has yet to start

run ()
    Method to be run in sub-process; can be overridden in sub-class

start ()
    Start child process

terminate ()
    Terminate process; sends SIGTERM signal or uses TerminateProcess()

class TaskPool.Pool.ResultHandler (outqueue, get, cache, poll, joinExitedWorkers, putlock)

body ()

exception TaskPool.Pool.SoftTimeLimitExceeded
    The soft time limit has been exceeded. This exception is raised to give the task a chance to clean up.

class TaskPool.Pool.Supervisor (pool)

body ()

class TaskPool.Pool.TaskHandler (taskqueue, put, outqueue, pool)

body ()

class TaskPool.Pool.TimeoutHandler (processes, cache, t_soft, t_hard, putlock)
body()

TaskPool.Pool.apply(func, args=(), kwds={})
Equivalent of apply() builtin

TaskPool.Pool.apply_async(func, args=(), kwds={}, callback=None, accept_callback=None, timeout_callback=None, waitforslot=False, error_callback=None)
Asynchronous equivalent of apply() builtin.
Callback is called when the functions return value is ready. The accept callback is called when the job is accepted to be executed.
Simplified the flow is like this:

```python
g>>> if accept_callback:
...     accept_callback()
>>> retval = func(*args, **kwds)
>>> if callback:
...     callback(retval)
```

TaskPool.Pool.close()

TaskPool.Pool.grow(n=1)

TaskPool.Pool.imap(func, iterable, chunksize=1)
Equivalent of itertools.imap() – can be MUCH slower than Pool.map()

TaskPool.Pool.imap_unordered(func, iterable, chunksize=1)
Like imap() method but ordering of results is arbitrary

TaskPool.Pool.join()

TaskPool.Pool.map(func, iterable, chunksize=None)
Equivalent of map() builtin

TaskPool.Pool.map_async(func, iterable, chunksize=None, callback=None)
Asynchronous equivalent of map() builtin

TaskPool.Pool.shrink(n=1)

TaskPool.Pool.terminate()

TaskPool.grow(n=1)

TaskPool.on_start()
Run the task pool.
Will pre-fork all workers so they're ready to accept tasks.

TaskPool.on_stop()
Gracefully stop the pool.

TaskPool.onTerminate()
Force terminate the pool.

TaskPool.shrink(n=1)

TaskPool.terminate_job(pid, signal=None)
11.5.12 celery.concurrency.processes.pool

class celery.concurrency.processes.pool.Pool(processes=None, initializer=None, initargs=(), maxtasksperchild=None, timeout=None, soft_timeout=None)

Class which supports an async version of the apply() builtin

class Process(group=None, target=None, name=None, args=(), kwargs={})

Process objects represent activity that is run in a separate process

The class is analogous to threading.Thread

authkey

daemon

Return whether process is a daemon

exccode

Return exit code of process or None if it has yet to stop

ident

Return identifier (PID) of process or None if it has yet to start

is_alive()

Return whether process is alive

join(timeout=None)

Wait until child process terminates

name

pid

Return identifier (PID) of process or None if it has yet to start

run()

Method to be run in sub-process; can be overridden in sub-class

start()

Start child process

terminate()

Terminate process; sends SIGTERM signal or uses TerminateProcess()

class Pool.ResultHandler(outqueue, get, cache, poll, joinExitedWorkers, putlock)

body()

exception Pool.SoftTimeLimitExceeded

The soft time limit has been exceeded. This exception is raised to give the task a chance to clean up.

class Pool.Supervisor(pool)

body()

class Pool.TaskHandler(taskqueue, put, outqueue, pool)

body()

class Pool.TimeoutHandler(processes, cache, t_soft, t_hard, putlock)

body()
Pool.apply(func, args=(), kwds={})
   Equivalent of apply() builtin

Pool.apply_async(func, args=(), kwds={}, callback=None, accept_callback=None, timeout_callback=None, waitforslot=False, error_callback=None)
   Asynchronous equivalent of apply() builtin.
   Callback is called when the functions return value is ready. The accept callback is called when the job is accepted to be executed.
   Simplified the flow is like this:

   >>> if accept_callback:
   ...     accept_callback()
   >>> retval = func(*args, **kwds)
   >>> if callback:
   ...     callback(retval)

Pool.close()
Pool.grow(n=1)
Pool.imap(func, iterable, chunksize=1)
   Equivalent of itertools.imap() – can be MUCH slower than Pool.map()
Pool.imap_unordered(func, iterable, chunksize=1)
   Like imap() method but ordering of results is arbitrary
Pool.join()
Pool.map(func, iterable, chunksize=None)
   Equivalent of map() builtin
Pool.map_async(func, iterable, chunksize=None, callback=None)
   Asynchronous equivalent of map() builtin
Pool.shrink(n=1)
Pool.terminate()

11.5.13 celery.concurrency.evlet† (experimental)

class celery.concurrency.evlet.Schedule(*args, **kwargs)
   clear()
   enter(entry, eta=None, priority=0)
   queue

class celery.concurrency.evlet.TaskPool(*args, **kwargs)

class Timer(schedule=None, on_error=None, on_tick=None, **kwargs)
   class Schedule(*args, **kwargs)
      clear()
      enter(entry, eta=None, priority=0)
queue
TaskPool.Timer.\texttt{ensure\_started}()
TaskPool.Timer.\texttt{start}()
TaskPool.Timer.\texttt{stop}()
TaskPool.\texttt{is\_green} = \texttt{True}
TaskPool.\texttt{on\_apply}(target, args=\texttt{None}, kwargs=\texttt{None}, callback=\texttt{None}, accept\_callback=\texttt{None}, **_
TaskPool.\texttt{on\_start}()
TaskPool.\texttt{on\_stop}()
TaskPool.\texttt{signal\_safe} = \texttt{False}

\texttt{class} \texttt{celery\_concurrency\_evlet.\_Timer}(schedule=\texttt{None}, on\_error=\texttt{None}, on\_tick=\texttt{None}, **kwargs)

\texttt{class Schedule (*args, **kwargs)}

\texttt{clear}()
\texttt{enter}(entry, eta=\texttt{None}, priority=\texttt{0})

\texttt{queue}
TaskPool.Timer.\texttt{ensure\_started}()
TaskPool.Timer.\texttt{start}()
TaskPool.Timer.\texttt{stop}()

celery.concurrency.evlet.\texttt{apply\_target}(target, args=(), kwargs={}, callback=\texttt{None}, accept\_callback=\texttt{None}, getpid=\texttt{None})

\texttt{11.5.14 celery.concurrency.evgl (experimental)}

\texttt{class} \texttt{celery\_concurrency\_evgl.\_Schedule (*args, **kwargs)}

\texttt{clear}()
\texttt{enter}(entry, eta=\texttt{None}, priority=\texttt{0})

\texttt{queue}
\texttt{class} \texttt{celery\_concurrency\_evgl.\_TaskPool(*args, **kwargs)}

\texttt{class Timer (schedule=\texttt{None}, on\_error=\texttt{None}, on\_tick=\texttt{None}, **kwargs)}

\texttt{class Schedule (*args, **kwargs)}

\texttt{clear}()
\texttt{enter}(entry, eta=\texttt{None}, priority=\texttt{0})

\texttt{queue}
TaskPool.Timer.\texttt{ensure\_started}()}
TaskPool.Timer.start()
TaskPool.Timer.stop()
TaskPool.is_green = True
TaskPool.on_apply(target, args=None, kwargs=None, callback=None, accept_callback=None, **_)
TaskPool.on_start()
TaskPool.on_stop()
TaskPool.signal_safe = False
class celery.concurrency.evg.Timer(schedule=None, on_error=None, on_tick=None, **kwargs)

class Schedule(*args, **kwargs)

clear()
enter(entry, eta=None, priority=0)
queue
Timer.ensure_started()
Timer.start()
Timer.stop()

11.5.15 celery.concurrency.base
class celery.concurrency.base.BasePool(limit=None, putlocks=True, logger=None, **options)

CLOSE = 2
RUN = 1
TERMINATE = 3
class Timer(schedule=None, on_error=None, on_tick=None, **kwargs)

class Entry (fun, args=None, kwargs=None)

cancel()
cancelled = False
class BasePool.Timer.Schedule(max_interval=2, on_error=None)
ETA scheduler.
clear()
empty()
Is the schedule empty?
enter(entry, eta=None, priority=0)
Enter function into the scheduler.
Parameters
• entry – Item to enter.
• eta – Scheduled time as a `datetime.datetime` object.
• priority – Unused.

```python
handle_error(exc_info)
info()

on_error = None

queue

BasePool.Timer.apply_after(msecs, fun=(), kwargs={}, priority=0)
BasePool.Timer.apply_at(eta, fun=(), kwargs={}, priority=0)
BasePool.Timer.apply_entry(entry)
BasePool.Timer.apply_interval(msecs, fun=(), kwargs={}, priority=0)
BasePool.Timer.cancel(tref)
BasePool.Timer.clear()
BasePool.Timer.empty()
BasePool.Timer.ensure_started()
BasePool.Timer.enter(entry, eta, priority=None)
BasePool.Timer.enter_after(msecs, entry, priority=0)
BasePool.Timer.exit_after(msecs, priority=10)
BasePool.Timer.next()
BasePool.Timer.on_tick = None
BasePool.Timer.queue
BasePool.Timer.run()
BasePool.Timer.running = False
BasePool.Timer.stop()
```

BasePool.active

```python
BasePool.apply_async(target, args=(), kwargs=(), callbacks=(), errbacks=(), accept_callback=(), timeout_callback=(), **compat)
```

Equivalent of the `apply()` built-in function.

All `callbacks` and `errbacks` should complete immediately since otherwise the thread which handles the result will get blocked.

BasePool.info

BasePool.is_green = False

```python
BasePool.on_apply(*args, **kwargs)
```

`BasePool.on_ready(callbacks, errbacks, ret_value)`

What to do when a worker task is ready and its return value has been collected.

BasePool.on_start()

BasePool.on_stop()

BasePool.on_terminate()
BasePool.on_worker_error(errbacks, exc)
BasePool.safe_apply_callback(fun, *args)
BasePool.signal_safe = True
BasePool.start()
BasePool.stop()
BasePool.terminate()
BasePool.terminate_job(pid)
celery.concurrency.base.apply_target(target, args=(), kwargs={}, callback=None, accept_callback=None, pid=None)

11.5.16 celery.concurrency.threads‡ (minefield)

class celery.concurrency.threads.TaskPool(*args, **kwargs)

    on_apply (target, args=None, kwargs=None, callback=None, accept_callback=None, **_)
    on_start()
    on_stop()

11.5.17 celery.beat

celery.beat.EmbeddedService(*args, **kwargs)
    Return embedded clock service.
    Parameters
    thread -- Run threaded instead of as a separate process. Default is False.
class celery.beat.PersistentScheduler(*args, **kwargs)

    close()
    get_schedule()
    info
    persistence = <module 'shelve' from '/usr/lib/python2.7/shelve.pyc'>
    setup_schedule()
    sync()

class celery.beat.ScheduleEntry(name=None, task=None, last_run_at=None, total_run_count=None, schedule=None, args=(), kwargs={}, options={}, relative=False)

    An entry in the scheduler.
    Parameters
    • name -- see name.
    • schedule -- see schedule.
    • args -- see args.
    • kwargs -- see kwargs.
    • options -- see options.
    • last_run_at -- see last_run_at.
    • total_run_count -- see total_run_count.
    • relative -- Is the time relative to when the server starts?
args = None
    Positional arguments to apply.

is_due()
    See celery.task.base.PeriodicTask.is_due().

kwargs = None
    Keyword arguments to apply.

last_run_at = None
    The time and date of when this task was last scheduled.

name = None
    The task name

next (last_run_at=None)
    Returns a new instance of the same class, but with its date and count fields updated.

options = None
    Task execution options.

schedule = None
    The schedule (run_every/crontab)

total_run_count = 0
    Total number of times this task has been scheduled.

update (other)
    Update values from another entry.
    Does only update “editable” fields (schedule, args, kwargs, options).

class celery.beat.Scheduler (schedule=None, logger=None, max_interval=None, app=None, Publisher=None, lazy=False, **kwargs)
    Scheduler for periodic tasks.
    Parameters
        • schedule – see schedule.
        • logger – see logger.
        • max_interval – see max_interval.

Entry
    alias of ScheduleEntry

add (**kwargs)

apply_async (entry, publisher=None, **kwargs)

close()

collection

get_schedule()

info

install_default_entries (data)

logger = None
    Current logger.

max_interval = 1
    Maximum time to sleep between re-checking the schedule.

maybe_due (entry, publisher=None)

merge_inplace (b)
publisher
reserve(entry)
schedule
    The schedule dict/shelve.
send_task(*args, **kwargs)
set_schedule(schedule)
setup_schedule()
sync()
tick()
    Run a tick, that is one iteration of the scheduler.
    Executes all due tasks.
update_from_dict(dict_)

exception celery.beat.SchedulingError
    An error occurred while scheduling a task.

class celery.beat.Service(logger=None, max_interval=None, schedule_filename=None, scheduler_cls=None, app=None)
    get_scheduled(lazy=False)
scheduler
    scheduler_cls
        alias of PersistentScheduler
    start(embedded_process=False)
    stop(wait=False)
sync()

11.5.18 celery.backends
celery.backends.get_backend_cls(backend, loader=None)
    Get backend class by name/alias

11.5.19 celery.backends.base
celery.backends.base
class celery.backends.base.BaseBackend(*args, **kwargs)
    Base backend class.
    EXCEPTION_STATES = frozenset(['FAILURE', 'RETRY', 'REVOKED'])
    READY_STATES = frozenset(['FAILURE', 'REVOKED', 'SUCCESS'])
    exception TimeoutError
        The operation timed out.
    BaseBackend.UNREADY_STATES = frozenset(['STARTED', 'RECEIVED', 'RETRY', 'PENDING'])
BaseBackend.cleanup()

BaseBackend.encode_result(result, status)

BaseBackend.exception_to_python(exc)
Convert serialized exception to Python exception.

BaseBackend.forget(task_id)

BaseBackend.get_result(task_id)
Get the result of a task.

BaseBackend.get_status(task_id)
Get the status of a task.

BaseBackend.get_traceback(task_id)
Get the traceback for a failed task.

BaseBackend.mark_as_done(task_id, result)
Mark task as successfully executed.

BaseBackend.mark_as_failure(task_id, exc, traceback=None)
Mark task as executed with failure. Stores the exception.

BaseBackend.mark_as_retry(task_id, exc, traceback=None)
Mark task as being retries. Stores the current exception (if any).

BaseBackend.mark_as_revoked(task_id)

BaseBackend.mark_as_started(task_id, **meta)
Mark a task as started

BaseBackend.prepare_exception(exc)
Prepare exception for serialization.

BaseBackend.prepare_value(result)
Prepare value for storage.

BaseBackend.process_cleanup()
Cleanup actions to do at the end of a task worker process.

BaseBackend.reload_task_result(task_id)
Reload task result, even if it has been previously fetched.

BaseBackend.reload_taskset_result(task_id)
Reload taskset result, even if it has been previously fetched.

BaseBackend.restore_taskset(taskset_id, cache=True)
Get the result of a taskset.

BaseBackend.save_taskset(taskset_id, result)
Store the result and status of a task.

BaseBackend.store_result(task_id, result, status)
Store the result and status of a task.

BaseBackend.wait_for(task_id, timeout=None, propagate=True, interval=0.5)
Wait for task and return its result.

If the task raises an exception, this exception will be re-raised by wait_for().

If timeout is not None, this raises the celery.exceptions.TimeoutError exception if the operation takes longer than timeout seconds.
class celery.backends.base.BaseDictBackend(*args, **kwargs)

    forget(task_id)
    get_result(task_id)
        Get the result of a task.
    get_status(task_id)
        Get the status of a task.
    get_task_meta(task_id, cache=True)
    get_taskset_meta(taskset_id, cache=True)
    get_traceback(task_id)
        Get the traceback for a failed task.
    reload_task_result(task_id)
    reload_taskset_result(taskset_id)
    restore_taskset(taskset_id, cache=True)
        Get the result for a taskset.
    save_taskset(taskset_id, result)
        Store the result of an executed taskset.
    store_result(task_id, result, status, traceback=None, **kwargs)
        Store task result and status.

class celery.backends.base.KeyValueStoreBackend(*args, **kwargs)

    delete(key)
    get(key)
    get_key_for_task(task_id)
        Get the cache key for a task by id.
    get_key_for_taskset(task_id)
        Get the cache key for a task by id.
    set(key, value)

11.5.20 celery.backends.database

class celery.backends.database.DatabaseBackend(dburi=None, resultExpires=0, engine_options=None, **kwargs)

    The database result backend.
    ResultSession()
    cleanup()
        Delete expired metadata.

11.5.21 celery.backends.cache

class celery.backends.cache.CacheBackend.expires=0, backend=None, options={}, **kwargs)
client
delete (key)
get (key)
set (key, value)

class celery.backends.cache.DummyClient (*args, **kwargs)

delete (key, *args, **kwargs)
get (key, *args, **kwargs)
set (key, value, *args, **kwargs)

celery.backends.cache.get_best_memcache (*args, **kwargs)

celery.backends.cache.import_best_memcache ()

11.5.22 celery.backends.amqp

class celery.backends.amqp.AMQPBackend (connection=None, exchange=None, exchange_type=None, persistent=None, serializer=None, auto_delete=True, expires=None, connection_max=None, **kwargs)

Publishes results by sending messages.

exception BacklogLimitExceeded

Too much state history to fast-forward.

class AMQPBackend.Consumer (channel, queues, no_ack=None, auto_declare=None, callbacks=None, on_decode_error=None)

Message consumer.

Parameters

• channel – see channel.
• queues – see queues.
• no_ack – see no_ack.
• auto_declare – see auto_declare
• callbacks – see callbacks.
• on_decode_error – see on_decode_error.

add_queue (queue)

auto_declare = True

callbacks = None

cancel ()

End all active queue consumers.

This does not affect already delivered messages, but it does mean the server will not send any more messages for this consumer.

cancel_by_queue (queue)

Cancel consumer by queue name.

channel = None

close ()

End all active queue consumers.
This does not affect already delivered messages, but it does mean the server will not send any more messages for this consumer.

`consume(no_ack=None)`
Register consumer on server.

`consuming_from(queue)`

`declare()`
Declare queues, exchanges and bindings.

This is done automatically at instantiation if `auto_declare` is set.

`flow(active)`
Enable/disable flow from peer.

This is a simple flow-control mechanism that a peer can use to avoid overflowing its queues or otherwise finding itself receiving more messages than it can process.

The peer that receives a request to stop sending content will finish sending the current content (if any), and then wait until flow is reactivated.

`no_ack = None`

`on_decode_error = None`

`purge()`
Purge messages from all queues.

**Warning:** This will delete all ready messages, there is no undo operation available.

`qos(prefetch_size=0, prefetch_count=0, apply_global=False)`
Specify quality of service.

The client can request that messages should be sent in advance so that when the client finishes processing a message, the following message is already held locally, rather than needing to be sent down the channel. Prefetching gives a performance improvement.

The prefetch window is Ignored if the `no_ack` option is set.

**Parameters**

- `prefetch_size` – Specify the prefetch window in octets. The server will send a message in advance if it is equal to or smaller in size than the available prefetch size (and also falls within other prefetch limits). May be set to zero, meaning “no specific limit”, although other prefetch limits may still apply.

- `prefetch_count` – Specify the prefetch window in terms of whole messages.

- `apply_global` – Apply new settings globally on all channels. Currently not supported by RabbitMQ.

`queues = None`

`receive(body, message)`
Method called when a message is received.

This dispatches to the registered callbacks.

**Parameters**

- `body` – The decoded message body.
• **message** – The *Message* instance.  
  Raises `NotImplementedError` If no consumer callbacks have been registered.

**recover** *(requeue=False)*

Redeliver unacknowledged messages.

Asks the broker to redeliver all unacknowledged messages on the specified channel.

**Parameters** **requeue** – By default the messages will be redelivered to the original recipient. With `requeue` set to true, the server will attempt to requeue the message, potentially then delivering it to an alternative subscriber.

**register_callback** *(callback)*

Register a new callback to be called when a message is received.

The signature of the callback needs to accept two arguments: `(body, message)`, which is the decoded message body and the *Message* instance (a subclass of *Message*).

**revive** *(channel)*

Revive consumer after connection loss.

**class** `AMQPBackend.Exchange` *(name='', type='', channel=None, **kwargs)*

An Exchange declaration.

**Parameters**

- **name** – See *name*.
- **type** – See *type*.
- **channel** – See *channel*.
- **durable** – See *durable*.
- **auto_delete** – See *auto_delete*.
- **delivery_mode** – See *delivery_mode*.
- **arguments** – See *arguments*.

**name**

Name of the exchange. Default is no name (the default exchange).

**type**

AMQP defines four default exchange types (routing algorithms) that covers most of the common messaging use cases. An AMQP broker can also define additional exchange types, so see your broker manual for more information about available exchange types.

- **direct** *(default)*

  Direct match between the routing key in the message, and the routing criteria used when a queue is bound to this exchange.

- **topic**

  Wildcard match between the routing key and the routing pattern specified in the exchange/queue binding. The routing key is treated as zero or more words delimited by `"."` and supports special wildcard characters. `"*"` matches a single word and `"#"` matches zero or more words.

- **fanout**

  Queues are bound to this exchange with no arguments. Hence any message sent to this exchange will be forwarded to all queues bound to this exchange.

- **headers**

  Queues are bound to this exchange with a table of arguments containing headers and values (optional). A special argument named “x-match” determines the matching algorithm, where “all” implies
an AND (all pairs must match) and “any” implies OR (at least one pair must match).

arguments is used to specify the arguments.

This description of AMQP exchange types was shamelessly stolen from the blog post AMQP in 10 minutes: Part 4 by Rajith Attapattu. This article is recommended reading.

channel
The channel the exchange is bound to (if bound).

durable
Durable exchanges remain active when a server restarts. Non-durable exchanges (transient exchanges) are purged when a server restarts. Default is True.

auto_delete
If set, the exchange is deleted when all queues have finished using it. Default is False.

delivery_mode
The default delivery mode used for messages. The value is an integer, or alias string.
  • 1 or “transient” The message is transient. Which means it is stored in memory only, and is lost if the server dies or restarts.
  • 2 or “persistent” (default) The message is persistent. Which means the message is stored both in-memory, and on disk, and therefore preserved if the server dies or restarts.

The default value is 2 (persistent).

arguments
Additional arguments to specify when the exchange is declared.

Message (body, delivery_mode=None, priority=None, content_type=None, content_encoding=None, properties=None, headers=None)
Create message instance to be sent with publish().

Parameters
  • body – Message body.
  • delivery_mode – Set custom delivery mode. Defaults to delivery_mode.
  • priority – Message priority, 0 to 9. (currently not supported by RabbitMQ).
  • content_type – The messages content_type. If content_type is set, no serialization occurs as it is assumed this is either a binary object, or you’ve done your own serialization. Leave blank if using built-in serialization as our library properly sets content_type.
  • content_encoding – The character set in which this object is encoded. Use “binary” if sending in raw binary objects. Leave blank if using built-in serialization as our library properly sets content_encoding.
  • properties – Message properties.
  • headers – Message headers.

PERSISTENT_DELIVERY_MODE = 2
TRANSIENT_DELIVERY_MODE = 1
attrs = ((‘name’, None), (‘type’, None), (‘arguments’, None), (‘durable’, <type ‘bool’>), (‘auto_delete’, <type ‘bool’>), auto_delete = False
**Celery Documentation, Release 2.2.10**

```python
declare (nowait=False)

Declare the exchange.

Creates the exchange on the broker.

**Parameters**
- **nowait** – If set the server will not respond, and a response will not be waited for. Default is False.

```delete (if_unused=False, nowait=False)

Delete the exchange declaration on server.

**Parameters**
- **if_unused** – Delete only if the exchange has no bindings. Default is False.
- **nowait** – If set the server will not respond, and a response will not be waited for. Default is False.

```
delivery_mode = 2
durable = True
name = ‘’
publish (message, routing_key=None, mandatory=False, immediate=False, exchange=None)

Publish message.

**Parameters**
- **message** – `Message()` instance to publish.
- **routing_key** – Routing key.
- **mandatory** – Currently not supported.
- **immediate** – Currently not supported.

```
type = ‘direct’
class AMQPBackend.Producer (channel, exchange=None, routing_key=None, serializer=None, auto_declare=None, compression=None, on_return=None)

Message Producer.

**Parameters**
- **channel** – Connection channel.
- **exchange** – Default exchange.
- **routing_key** – Default routing key.
- **serializer** – Default serializer. Default is “json”.
- **compression** – Default compression method. Default is no compression.
- **auto_declare** – Automatically declare the exchange at instantiation. Default is True.
- **on_return** – Callback to call for undeliverable messages, when the mandatory or immediate arguments to publish() is used. This callback needs the following signature: (exception, exchange, routing_key, message). Note that the producer needs to drain events to use this feature.

```
auto_declare = True
channel = None
close ()
compression = None
declare ()

Declare the exchange.

This is done automatically at instantiation if `auto_declare` is set to True.
exchange = None
on_return = None

```
publish(body, routing_key=None, delivery_mode=None, mandatory=False, immediate=False, priority=0, content_type=None, content_encoding=None, serializer=None, headers=None, compression=None, exchange=None, **properties)
```

Publish message to the specified exchange.

**Parameters**

- **body** – Message body.
- **routing_key** – Message routing key.
- **delivery_mode** – See `delivery_mode`.
- **mandatory** – Currently not supported.
- **immediate** – Currently not supported.
- **priority** – Message priority. A number between 0 and 9.
- **content_type** – Content type. Default is auto-detect.
- **content_encoding** – Content encoding. Default is auto-detect.
- **serializer** – Serializer to use. Default is auto-detect.
- **headers** – Mapping of arbitrary headers to pass along with the message body.
- **exchange** – Override the exchange. Note that this exchange must have been declared.
- **properties** – Additional properties, see the AMQP spec.

```
release()
```

```
revive(channel)
```

Revive the producer after connection loss.

```
routing_key = ''
serializer = None
```

class AMQPBackend.Queue(name='', exchange=None, routing_key='', channel=None, **kwargs)

A Queue declaration.

**Parameters**

- **name** – See `name`.
- **exchange** – See `exchange`.
- **routing_key** – See `routing_key`.
- **channel** – See `channel`.
- **durable** – See `durable`.
- **exclusive** – See `exclusive`.
- **auto_delete** – See `auto_delete`.
- **queue_arguments** – See `queue_arguments`.
- **binding_arguments** – See `binding_arguments`.

```
name
```

Name of the queue. Default is no name (default queue destination).

```
exchange
```

The Exchange the queue binds to.
**routing_key**

The routing key (if any), also called *binding key*.

The interpretation of the routing key depends on the `Exchange.type`.

- **direct exchange**
  Matches if the routing key property of the message and the `routing_key` attribute are identical.

- **fanout exchange**
  Always matches, even if the binding does not have a key.

- **topic exchange**
  Matches the routing key property of the message by a primitive pattern matching scheme. The message routing key then consists of words separated by dots (".", like domain names), and two special characters are available: star ("*") and hash ("#”). The star matches any word, and the hash matches zero or more words. For example "*.stock.#" matches the routing keys "usd.stock" and "eur.stock.db" but not "stock.nasdaq".

**channel**

The channel the Queue is bound to (if bound).

**durable**

Durable queues remain active when a server restarts. Non-durable queues (transient queues) are purged if/when a server restarts. Note that durable queues do not necessarily hold persistent messages, although it does not make sense to send persistent messages to a transient queue.

Default is `True`.

**exclusive**

Exclusive queues may only be consumed from by the current connection. Setting the ‘exclusive’ flag always implies ‘auto-delete’.

Default is `False`.

**auto_delete**

If set, the queue is deleted when all consumers have finished using it. Last consumer can be cancelled either explicitly or because its channel is closed. If there was no consumer ever on the queue, it won’t be deleted.

**queue_arguments**

Additional arguments used when declaring the queue.

**binding_arguments**

Additional arguments used when binding the queue.

**alias**

Unused in Kombu, but application can take advantage of this. For example to give alternate names to queues with automatically generated queue names.

```python
attrs = (('name', None), ('exchange', None), ('routing_key', None), ('queue_arguments', None), ('binding_arguments', None), ('durable', <type 'bool'>), ('exclusive', <type 'bool'>), ('auto_delete', <type 'bool'>), ('no_ack', None), ('alias', None))
```

```python
auto_delete = False
```

**cancel** *(consumer_tag)*

Cancel a consumer by consumer tag.

**consume** *(consumer_tag='', callback=None, no_ack=None, nowait=False)*

Start a queue consumer.

Consumers last as long as the channel they were created on, or until the client cancels them.

**Parameters**
• **consumer_tag** – Unique identifier for the consumer. The consumer tag is local to a connection, so two clients can use the same consumer tags. If this field is empty the server will generate a unique tag.

• **no_ack** – If set messages received does not have to be acknowledged.

• **nowait** – Do not wait for a reply.

• **callback** – callback called for each delivered message

```python
default
```

Declares the queue, the exchange and binds the queue to the exchange.

```python
default
```

Delete the queue.

**Parameters**

- **if_unused** – If set, the server will only delete the queue if it has no consumers. A channel error will be raised if the queue has consumers.

- **if_empty** – If set, the server will only delete the queue if it is empty. If it is not empty a channel error will be raised.

- **nowait** – Do not wait for a reply.

```python

default
```

Poll the server for a new message.

Returns the message instance if a message was available, or None otherwise.

**Parameters**

- **no_ack** – If set messages received does not have to be acknowledged.

This method provides direct access to the messages in a queue using a synchronous dialogue, designed for specific types of applications where synchronous functionality is more important than performance.

```python

default
```

Remove all messages from the queue.

```python

default
```

Create the queue binding on the server.

**Parameters**

- **nowait** – Do not wait for a reply.

```python

default
```

Declare queue on the server.

**Parameters**

- **nowait** – Do not wait for a reply.

- **passive** – If set, the server will not create the queue. The client can use this to check whether a queue exists without modifying the server state.

```python

default
```

Delete the binding on the server.
when_bound()
AMQPB...consume(task_id, timeout=None)
AMQPB...drain_events(connection, consumer, timeout=None, now=<built-in function time>)
AMQPB...get_many(task_ids, timeout=None)
AMQPB...get_task_meta(task_id, cache=True)
AMQPB...poll(task_id, backlog_limit=100)
AMQPB...pool
AMQPB...reload_task_result(task_id)
AMQPB...reload_taskset_result(task_id)
    Reload taskset result, even if it has been previously fetched.
AMQPB...restore_taskset(taskset_id, cache=True)
    Get the result of a taskset.
AMQPB...revive(channel)
AMQPB...save_taskset(taskset_id, result)
    Store the result and status of a task.
AMQPB...wait_for(task_id, timeout=None, cache=True, propagate=True, **kwargs)

exception celery.backends.amqp.BacklogLimitExceeded
    Too much state history to fast-forward.

celery.backends.amqp.repair_uuid(s)

11.5.23 celery.backends.mongodb

MongoDB backend for celery.

class celery.backends.mongodb.Bunch(**kw)
class celery.backends.mongodb.MongoBackend(*args, **kwargs)

    cleanup()
        Delete expired metadata.
        mongodb_database = ‘celery’
mongodb_host = ‘localhost’
mongodb_password = None
mongodb_port = 27017
mongodb_taskmeta_collection = ‘celery_taskmeta’
mongodb_user = None
process_cleanup()
11.5.24 celery.backends.pyredis

class celery.backends.pyredis.RedisBackend(redis_host=None, redis_port=None, redis_db=None, redis_password=None, expires=None, **kwargs)

Redis task result store.

client

delete (key)

get (key)

process_cleanup ()

redis = None

redis-py client module.

redis_db = 0

redis_host = ‘localhost’

default Redis server hostname (localhost).

redis_password = None

default Redis password (None)

redis_port = 6379

default Redis server port (6379)

set (key, value)

11.5.25 celery.backends.cassandra

celery.backends.cassandra

class celery.backends.cassandra.CassandraBackend(servers=None, keyspace=None, column_family=None, cassandra_options=None, **kwargs)

Highly fault tolerant Cassandra backend.

servers

List of Cassandra servers with format: “hostname:port”.

Raises celery.exceptions.ImproperlyConfigured if module pycassa is not available.

cleanup ()

Delete expired metadata.

column_family = None

i = 63

keyspace = None

process_cleanup ()

servers = []

11.5.26 celery.backends.tyrant

celery.backends.tyrant
class celery.backends.tyrant.TyrantBackend (tyrant_host=None, tyrant_port=None, **kwargs)
Tokyo Cabinet based task backend store.

    tyrant_host
    The hostname to the Tokyo Tyrant server.

    tyrant_port
    The port to the Tokyo Tyrant server.

    close()
    Close the tyrant connection and remove the cache.

    delete (key)
    get (key)

    open()
    Get pytyrant.PyTyrant instance with the current server configuration.
    The connection is then cached until you do an explicit close().

    process_cleanup()

    set (key, value)

    tyrant_host = None
    tyrant_port = None

11.5.27 celery.execute.trace

class celery.execute.trace.TaskTrace (task_name, task_id, args, kwargs, task=None, request=None, propagate=None, **__)

    execute()

    handle_after_return (status, retval, type_, tb, strtb)

    handle_failure (exc, type_, tb, strtb)
    Handle exception.

    handle_retry (exc, type_, tb, strtb)
    Handle retry exception.

    handle_success (retval, *args)
    Handle successful execution.

class celery.execute.trace.TraceInfo (status='PENDING', retval=None, exc_info=None)

    classmethod trace (fun, args, kwargs, propagate=False)
    Trace the execution of a function, calling the appropriate callback if the function raises retry, an failure or returned successfully.

    Parameters propagate – If true, errors will propagate to the caller.

11.5.28 celery.datastructures

Custom data structures.

    copyright

**license**  BSD, see LICENSE for more details.

- **TokenBucket**
- **AttributeDict**
- **DictAttribute**
- **ConfigurationView**
- **ExceptionInfo**
- **LimitedSet**
- **LocalCache**
- **Functions**

### TokenBucket

**class**  `celery.datastructures.TokenBucket (fill_rate, capacity=1)`

Token Bucket Algorithm.


**Thread safety**

This implementation may not be thread safe.

**can_consume (tokens=1)**

Returns `True` if `tokens` number of tokens can be consumed from the bucket.

**capacity = 1**

Maximum number of tokens in the bucket.

**expected_time (tokens=1)**

Returns the expected time in seconds when a new token should be available.

**Warning**

This consumes a token from the bucket.

**fill_rate = None**

The rate in tokens/second that the bucket will be refilled

**timestamp = None**

Timestamp of the last time a token was taken out of the bucket.

### AttributeDict

**class**  `celery.datastructures.AttributeDict`

Dict subclass with attribute access.

**class**  `celery.datastructures.AttributeDictMixin`

Adds attribute access to mappings.

`d.key -> d[key]`
**DictAttribute**

```python
class celery.datastructures.DictAttribute(obj):
    Dict interface to attributes.
    obj[k] -> obj.k

get (key, default=None)
iteritems ()
setdefault (key, default)
```

**ConfigurationView**

```python
class celery.datastructures.ConfigurationView(changes, defaults):
    A view over an applications configuration dicts.
    If the key does not exist in changes, the defaults dict is consulted.

    Parameters
    • changes – Dict containing changes to the configuration.
    • defaults – Dict containing the default configuration.

    changes = None
    defaults = None

get (key, default=None)
items ()
iteritems ()
iterkeys ()
itervalues ()
keys ()
setdefault (key, default)
update (*args, **kwargs)
values ()
```

**ExceptionInfo**

```python
class celery.datastructures.ExceptionInfo(exc_info):
    Exception wrapping an exception and its traceback.
    Parameters exc_info – The exception info tuple as returned by sys.exc_info().

    exception = None
    The original exception.

    traceback = None
    A traceback form the point when exception was raised.
```

**LimitedSet**

```python
class celery.datastructures.LimitedSet(maxlen=None, expires=None)
    Kind-of Set with limitations.
```
Good for when you need to test for membership \((a \in \text{set})\), but the list might become to big, so you want to limit it so it doesn’t consume too much resources.

**Parameters**

- **maxlen** – Maximum number of members before we start evicting expired members.
- **expires** – Time in seconds, before a membership expires.

**add**(value)

Add a new member.

**as_dict**()

**clear**()  
Remove all members

**first**

Get the oldest member.

**pop_value**(value)

Remove membership by finding value.

**update**(other)

---

**LocalCache**

**class** celery.datastructures.LocalCache(limit=None)

Dictionary with a finite number of keys.

Older items expires first.

---

**Functions**

**celery.datastructures.consume_queue**(queue)

Iterator yielding all immediately available items in a Queue.Queue.

The iterator stops as soon as the queue raises Queue.Empty.

**Examples**

```python
>>> q = Queue()
>>> map(q.put, range(4))
>>> list(consume_queue(q))
[0, 1, 2, 3]
>>> list(consume_queue(q))
[]
```

---

**11.5.29 celery.routes**

**class** celery.routes.MapRoute(map)

Creates a router out of a dict.

**route_for_task**(task, *args, **kwargs)

**class** celery.routes.Router(routes=None, queues=None, create_missing=False, app=None)

**expand_destination**(route)
lookup_route(task, args=None, kwargs=None)

route(options, task, args=(), kwargs={})
celery.routes.prepare(routes)

Expands the CELEPy ROUTES setting.

11.5.30 celery.log

celery.log
class celery.log.ColorFormatter(msg, use_color=True)

COLORS
  Loglevel -> Color mapping.
colors
format(record)
formatException(ei)
class celery.log.Logging(app)

colored(logfile=None)
get_default_logger(loglevel=None, name='celery')
  Get default logger instance.
  Parameters
    loglevel – Initial log level.
get_task_logger(loglevel=None, name=None)
redirect_stdoutsto_logger(logger, loglevel=None)
  Redirect sys.stdout and sys.stderr to a logging instance.
  Parameters
    • logger – The logging.Logger instance to redirect to.
    • loglevel – The loglevel redirected messages will be logged as.
setup_logger(loglevel=None, logfile=None, format=None, colorize=None, name='celery', root=True, app=None, **kwargs)
  Setup the multiprocessing logger.
  If logfile is not specified, then sys.stderr is used.
  Returns logger object.
setup_logging_subsystem(loglevel=None, logfile=None, format=None, colorize=None, **kwargs)
setup_task_logger(loglevel=None, logfile=None, format=None, colorize=None, task_name=None, task_id=None, propagate=False, app=None, **kwargs)
  Setup the task logger.
  If logfile is not specified, then sys.stderr is used.
  Returns logger object.
supports_color(logfile=None)
class celery.log.LoggingProxy(logger, loglevel=None)
  Forward file object to logging.Logger instance.
  Parameters
• **logger** – The `logging.Logger` instance to forward to.
• **loglevel** – Loglevel to use when writing messages.

```python
close()
```

When the object is closed, no write requests are forwarded to the logging object anymore.

```python
closed = False
```

```python
fileno()
```

```python
flush()
```

This object is not buffered so any `flush()` requests are ignored.

```python
isatty()
```

Always returns `False`. Just here for file support.

```python
loglevel = 40
```

```python
mode = 'w'
```

```python
name = None
```

```python
write(data)
```

```python
writelines(sequence)
```

```python
writelines(sequence_of_strings) -> None.
```

Write the strings to the file.

The sequence can be any iterable object producing strings. This is equivalent to calling `write()` for each string.

```python
class celery.log.SilenceRepeated(action, max_iterations=10)
```

Only log action every n iterations.

### 11.5.31 celery.events.snapshot

```python
class celery.events.snapshot.Polaroid(state, freq=1.0, maxrate=None, cleanup_freq=3600.0, logger=None, timer=None, app=None)
```

```python
cancel()
```

```python
capture()
```

```python
cleanup()
```

```python
cleanup_signal = <Signal: Signal>
```

```python
clear_after = False
```

```python
install()
```

```python
on_cleanup()
```

```python
on_shutter(state)
```

```python
shutter()
```

```python
shutter_signal = <Signal: Signal>
```

```python
timer = <module 'celery.utils.timer2' from '../celery/utils/timer2.pyc'>
```

```python
celery.events.snapshot.evcam(camera, freq=1.0, maxrate=None, loglevel=0, logfile=None, pidfile=None, timer=None, app=None)
```

11.5. Internal Module Reference
11.5.32 celery.events.cursesmon

class celery.events.cursesmon.CursesMonitor (state, keymap=None, app=None)

    alert (callback, title=None)
    alert_remote_control_reply (reply)
    background = 7
    display_height
    display_task_row (lineno, task)
    display_width
    draw ()
    find_position ()
    foreground = 0
    format_row (uuid, task, worker, timestamp, state)
    greet = ‘celeryev 2.2.10’
    handle_keypress ()
    help = ‘j:up k:down i:info t:traceback r:result c:revoke ^c: quit’
    help_title = ‘Keys: ‘
    info_str = ‘Info: ‘
    init_screen ()
    keymap = {}  
    limit
    move_selection (direction=1)
    move_selection_down ()
    move_selection_up ()
    nap ()
    online_str = ‘Workers online: ‘
    readline (x, y)
    resetscreen ()
    revoke_selection ()
    safe_add_str (y, x, string, *args, **kwargs)
    screen_delay = 10
    screen_height
    screen_width
    selected_position = 0
    selected_str = ‘Selected: ‘
```python
selected_task = None
selection_info()
selection_rate_limit()
selection_result()
selection_traceback()
tasks
win = None
workers
class celery.events.cursesmon.DisplayThread(display)
    run()
celery.events.cursesmon.evtop(app=None)

11.5.33 celery.events.dumper
class celery.events.dumper.Dumper
    format_task_event(hostname, timestamp, type, task, event)
on_event(event)
celery.events.dumper.efdump(app=None)
celery.events.dumper.humanize_type(type)

11.5.34 celery.db.models
class celery.db.models.Task(task_id)
    Task result/status.
    date_done
    id
    result
    status
    task_id
    to_dict()
    traceback
class celery.db.models.TaskSet(taskset_id, result)
    TaskSet result
    date_done
    id
    result
    taskset_id
```

11.5. Internal Module Reference
to_dict()

11.5.35 celery.db.session

celery.db.session.ResultSession(dburi, **kwargs)
celery.db.session.create_session(dburi, **kwargs)
celery.db.session.get_engine(dburi, **kwargs)
celery.db.session.setup_results(engine)

11.5.36 celery.utils

celery.utils.abbr(S, max, ellipsis='...')
celery.utils.abbrtask(S, max)
celery.utils.chunks(it, n)
   Split an iterator into chunks with n elements each.
   Examples
   # n == 2 >>> x = chunks(iter([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]), 2) >>> list(x) [[0, 1], [2, 3], [4, 5], [6, 7], [8, 9], [10]]
   # n == 3 >>> x = chunks(iter([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]), 3) >>> list(x) [[0, 1, 2], [3, 4, 5], [6, 7, 8], [9, 10]]
celery.utils.cry()
   Return stacktrace of all active threads.
   From https://gist.github.com/737056

celery.utils.deprecated(description=None, deprecation=None, removal=None, alternative=None)
celery.utils.first(predicate, iterable)
   Returns the first element in iterable that predicate returns a True value for.
celery.utils.firstmethod(method)
   Returns a functions that with a list of instances, finds the first instance that returns a value for the given method.
   The list can also contain promises (promise)
celery.utils.fun_takes_kwargs(fun, kwlist=[])}
   With a function, and a list of keyword arguments, returns arguments in the list which the function takes.
   If the object has an argspec attribute that is used instead of using the inspect.getargspec() introspection.
   Parameters
   • fun – The function to inspect arguments of.
   • kwlist – The list of keyword arguments.
   Examples

>>> def foo(self, x, y, logfile=None, loglevel=None):
    ...    return x * y
>>> fun_takes_kwargs(foo, ["logfile", "loglevel", "task_id"])
["logfile", "loglevel"]

>>> def foo(self, x, y, **kwargs):
>>> fun_takes_kwargs(foo, ["logfile", "loglevel", "task_id"])
["logfile", "loglevel", "task_id"]
celery.utils.get_cls_by_name(name, aliases={}, imp=None)

Get class by name.

The name should be the full dot-separated path to the class:

modulename.ClassName

Example:

celery.concurrency.processes.TaskPool

^- class name

If aliases is provided, a dict containing short name/long name mappings, the name is looked up in the aliases first.

Examples:

>>> get_cls_by_name("celery.concurrency.processes.TaskPool")
<class 'celery.concurrency.processes.TaskPool'>

>>> get_cls_by_name("default", {
...   "default": "celery.concurrency.processes.TaskPool"})
<class 'celery.concurrency.processes.TaskPool'>

# Does not try to look up non-string names.
>>> from celery.concurrency.processes import TaskPool
>>> get_cls_by_name(TaskPool) is TaskPool True

celery.utils.get_full_cls_name(cls)

With a class, get its full module and class name.

celery.utils.get_symbol_by_name(name, aliases={}, imp=None)

Get class by name.

The name should be the full dot-separated path to the class:

modulename.ClassName

Example:

celery.concurrency.processes.TaskPool

^- class name

If aliases is provided, a dict containing short name/long name mappings, the name is looked up in the aliases first.

Examples:

>>> get_cls_by_name("celery.concurrency.processes.TaskPool")
<class 'celery.concurrency.processes.TaskPool'>

>>> get_cls_by_name("default", {
...   "default": "celery.concurrency.processes.TaskPool"})
<class 'celery.concurrency.processes.TaskPool'>

# Does not try to look up non-string names.
>>> from celery.concurrency.processes import TaskPool
>>> get_cls_by_name(TaskPool) is TaskPool True
Celery Documentation, Release 2.2.10

celery.utils.import_from_cwd(module, imp=None)
Import module, but make sure it finds modules located in the current directory.
Modules located in the current directory has precedence over modules located in sys.path.

celery.utils.instantiate(name, *args, **kwargs)
Instantiate class by name.
See get_cls_by_name().

celery.utils.is_iterable(obj)

celery.utils.isatty(fh)

celery.utils.kwdict(kwargs)
Make sure keyword arguments are not in unicode.
This should be fixed in newer Python versions, see: http://bugs.python.org/issue4978.

celery.utils.lmerge(L, R)
Left precedent dictionary merge. Keeps values from l, if the value in r is None.

celery.utils.mattrgetter(*attrs)
Like operator.itemgetter() but returns None on missing attributes instead of raising AttributeError.

celery.utils.maybePromise(value)
Evaluates if the value is a promise.

class celery.utils.promise(fun, *args, **kwargs)
A promise.
Evaluated when called or if the evaluate() method is called. The function is evaluated on every access, so the value is not memoized (see mpromise).
Overloaded operations that will evaluate the promise: __str__(), __repr__(), __cmp__().
evaluate()
celery.utils.textindent \( (t, \text{indent=0}) \)
Indent text.
celery.utils.truncate_text \( (text, maxlen=128, suffix='...') \)
Truncates text to a maximum number of characters.

## 11.5.37 celery.utils.term

term utils.

```python
c = colored(enabled=True)
print(str(c.red("the quick "), c.blue("brown ", c.bold("fox ")),
c.magenta(c.underline("jumps over")),
c.yellow(" the lazy "),
c.green("dog ")))
```

```python
class celery.utils.term.colored(*s, **kwargs)
    black (*s)
    blink (*s)
    blue (*s)
    bold (*s)
    bright (*s)
    cyan (*s)
    green (*s)
    iblue (*s)
    icyan (*s)
    igreen (*s)
    imagenta (*s)
    ired (*s)
    iwhite (*s)
    iyellow (*s)
    magenta (*s)
    no_color()
    node \( (s, op) \)
    red (*s)
    reset (*s)
    reverse (*s)
    underline (*s)
    white (*s)
    yellow (*s)
```
celery.utils.term.fg(s)

### 11.5.38 celery.utils.timeutils

**celery.utils.timeutils.delta_resolution** *(dt, delta)*

Round a datetime to the resolution of a timedelta.

If the timedelta is in days, the datetime will be rounded to the nearest days, if the timedelta is in hours the datetime will be rounded to the nearest hour, and so on until seconds which will just return the original datetime.

**celery.utils.timeutils.humanize_seconds** *(secs, prefix=’’)*

Show seconds in human form, e.g. 60 is “1 minute”, 7200 is “2 hours”.

**celery.utils.timeutils.maybe_iso8601** *(dt)*

Either datetime | str -> datetime or None -> None

**celery.utils.timeutils.maybe_timedelta** *(delta)*

Coerces integer to timedelta if *delta* is an integer.

**celery.utils.timeutils.rate** *(rate)*

Parses rate strings, such as “100/m” or “2/h” and converts them to seconds.

**celery.utils.timeutils.remaining** *(start, ends_in, now=None, relative=True)*

Calculate the remaining time for a start date and a timedelta.

e.g. “how many seconds left for 30 seconds after start?”

**Parameters**

- **start** – Start datetime.
- **ends_in** – The end delta as a timedelta.
- **relative** – If set to False, the end time will be calculated using delta_resolution() (i.e. rounded to the resolution of ends_in).
- **now** – Function returning the current time and date, defaults to datetime.now().

**celery.utils.timeutils.timedelta_seconds** *(delta)*

Convert datetime.timedelta to seconds.

Doesn’t account for negative values.

**celery.utils.timeutils.weekday** *(name)*

Return the position of a weekday (0 - 7, where 0 is Sunday).

Example:

```python
>>> weekday("sunday"), weekday("sun"), weekday("mon")
(0, 0, 1)
```

### 11.5.39 celery.utils.encoding

**celery.utils.encoding.default_encoding()**

**celery.utils.encoding.safe_repr** *(o, errors='replace')**

**celery.utils.encoding.safe_str** *(s, errors='replace')**
11.5.40 celery.utils.compat

```python
class celery.utils.compat.CompatOrderedDict(*args, **kwds):
    Dictionary that remembers insertion order
    
    clear() \rightarrow None. Remove all items from od.
    
    copy() \rightarrow a shallow copy of od

    classmethod fromkeys(S, v) \rightarrow New ordered dictionary with keys from S
    and values equal to v (which defaults to None).
    
    items()
    iteritems()
    iterkeys()
    itervalues()
    keys()
    pop(key, default=<object object at 0x7f488e0753f0>)
    popitem() \rightarrow (k, v)
    Return and remove a (key, value) pair. Pairs are returned in LIFO order if last is true or FIFO order if false.
    
    setdefault(key, default=None)
    update(other=(), **kwds)
    values()
```

11.5.41 celery.utils.mail

```python
class celery.utils.mail.Mailer(host='localhost', port=0, user=None, password=None, timeout=2)
    send(message)

class celery.utils.mail.Message(to=None, sender=None, subject=None, body=None, charset='us-ascii')
    exception celery.utils.mail.SendmailWarning
    Problem happened while sending the e-mail message.
```

11.5.42 celery.utils.patch

```python
celery.utils.patch.ensure_process_aware_logger()
```

11.5.43 celery.utils.functional

Functional utilities for Python 2.4 compatibility.
11.5.44 celery.utils.serialization

exception celery.utils.serialization.UnpickleableExceptionWrapper(exc_module, exc_cls_name, exc_args)

Wraps unpickleable exceptions.

Parameters

• **exc_module** – see `exc_module`.
• **exc_cls_name** – see `exc_cls_name`.
• **exc_args** – see `exc_args`

Example

```python
>>> try:
...     something_raising_unpickleable_exc()
>>> except Exception, e:
...     exc = UnpickleableException(e.__class__.__module__,
...                                  e.__class__.__name__,
...                                  e.args)
...     pickle.dumps(exc)  # Works fine.
```

exc_args = None

The arguments for the original exception.

exc_cls_name = None

The name of the original exception class.

exc_module = None

The module of the original exception.

classmethod from_exception(exc)

restore()

celery.utils.serialization.create_exception_cls(name, module, parent=None)

Dynamically create an exception class.

celery.utils.serialization.find_nearest_pickleable_exception(exc)

With an exception instance, iterate over its super classes (by mro) and find the first super exception that is pickleable. It does not go below Exception (i.e. it skips Exception, BaseException and object). If that happens you should use UnpickleableException instead.

Parameters **exc** – An exception instance.

Returns the nearest exception if it’s not Exception or below, if it is it returns None.

:rtype Exception:

celery.utils.serialization.get_pickleable_exception(exc)

Make sure exception is pickleable.

celery.utils.serialization.get_pickled_exception(exc)

Get original exception from exception pickled using `get_pickleable_exception()`.

celery.utils.serialization.subclass_exception(name, parent, module)

List of base classes we probably don’t want to reduce to.

11.5.45 celery.utils.timer2

timer2 - Scheduler for Python functions.
class celery.utils.timer2.Entry (fun, args=None, kwargs=None)

    cancel()
    cancelled = False

class celery.utils.timer2.Schedule (max_interval=2, on_error=None)
    ETA scheduler.
    clear()
    empty()
        Is the schedule empty?
    enter (entry, eta=None, priority=0)
        Enter function into the scheduler.

        Parameters
        • entry – Item to enter.
        • eta – Scheduled time as a datetime.datetime object.
        • priority – Unused.

    handle_error (exc_info)
    info()
    on_error = None

queue

exception celery.utils.timer2.TimedFunctionFailed

class celery.utils.timer2.Timer (schedule=None, on_error=None, on_tick=None, **kwargs)

    class Entry (fun, args=None, kwargs=None)

        cancel()
        cancelled = False

    class Timer.Schedule (max_interval=2, on_error=None)
        ETA scheduler.
        clear()
        empty()
            Is the schedule empty?
        enter (entry, eta=None, priority=0)
            Enter function into the scheduler.

            Parameters
            • entry – Item to enter.
            • eta – Scheduled time as a datetime.datetime object.
            • priority – Unused.

        handle_error (exc_info)
        info()
        on_error = None

queue

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Timer.apply_after (msecs, fun, args=(), kwargs={}, priority=0)
Timer.apply_at (eta, fun, args=(), kwargs={}, priority=0)
Timer.apply_entry (entry)
Timer.apply_interval (msecs, fun, args=(), kwargs={}, priority=0)
Timer.cancel (tref)
Timer.clear ()
Timer.empty ()
Timer.ensure_started ()
Timer.enter (entry, eta, priority=None)
Timer.enter_after (msecs, entry, priority=0)
Timer.exit_after (msecs, priority=10)
Timer.next ()
Timer.on_tick = None
Timer.queue
Timer.run ()
Timer.running = False
Timer.stop ()
celery.utils.timer2.to_timestamp (d)

11.5.46 celery.utils.dispatch

class celery.utils.dispatch.Signal (providing_args=None)
    Base class for all signals

    receivers
    Internal attribute, holds a dictionary of
    '{receiverkey (id): weakref(receiver)}' mappings.

    connect (receiver, sender=None, weak=True, dispatch_uid=None)
        Connect receiver to sender for signal.

        Parameters
        • receiver – A function or an instance method which is to receive signals. Receivers must be hashable objects.
          if weak is True, then receiver must be weak-referencable (more precisely saferef.safe_ref() must be able to create a reference to the receiver).
          Receivers must be able to accept keyword arguments.
          If receivers have a dispatch_uid attribute, the receiver will not be added if another receiver already exists with that dispatch_uid.
        • sender – The sender to which the receiver should respond. Must either be of type Signal, or None to receive events from any sender.
        • weak – Whether to use weak references to the receiver. By default, the module will attempt to use weak references to the receiver objects. If this parameter is false, then strong references will be used.
• **dispatch_uid** – An identifier used to uniquely identify a particular instance of a receiver. This will usually be a string, though it may be anything hashable.

**disconnect** *(receiver=None, sender=None, weak=True, dispatch_uid=None)*

Disconnect receiver from sender for signal.

If weak references are used, disconnect need not be called. The receiver will be removed from dispatch automatically.

**Parameters**

- **receiver** – The registered receiver to disconnect. May be none if **dispatch_uid** is specified.
- **sender** – The registered sender to disconnect.
- **weak** – The weakref state to disconnect.
- **dispatch_uid** – the unique identifier of the receiver to disconnect

**send** *(sender, **named)**

Send signal from sender to all connected receivers.

If any receiver raises an error, the error propagates back through send, terminating the dispatch loop, so it is quite possible to not have all receivers called if a raises an error.

**Parameters**

- **sender** – The sender of the signal. Either a specific object or **None**.
- ****named – Named arguments which will be passed to receivers.

**Returns** a list of tuple pairs: [(receiver, response), ... ].

**send_robust** *(sender, **named)**

Send signal from sender to all connected receivers catching errors.

**Parameters**

- **sender** – The sender of the signal. Can be any python object (normally one registered with a connect if you actually want something to occur).
- ****named – Named arguments which will be passed to receivers. These arguments must be a subset of the argument names defined in providing_args.

**Returns** a list of tuple pairs: [(receiver, response), ... ].

**Raises DispatcherKeyError** if any receiver raises an error (specifically any subclass of **Exception**), the error instance is returned as the result for that receiver.

### 11.5.47 celery.utils.dispatch.signal

Signal class.

**class** celery.utils.dispatch.signal.**Signal** *(providing_args=None)*

Base class for all signals

- **receivers**

  Internal attribute, holds a dictionary of

  `{receiverkey (id): weakref(receiver)}` mappings.

  **connect** *(receiver, sender=None, weak=True, dispatch_uid=None)*

  Connect receiver to sender for signal.

  **Parameters**

  - **receiver** – A function or an instance method which is to receive signals. Receivers must be hashable objects.

    if weak is True, then receiver must be weak-referencable (more precisely

    `saferef.safe_ref()` must be able to create a reference to the receiver).

    Receivers must be able to accept keyword arguments.

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If receivers have a dispatch_uid attribute, the receiver will not be added if another receiver already exists with that dispatch_uid.

- **sender** – The sender to which the receiver should respond. Must either be of type Signal, or None to receive events from any sender.
- **weak** – Whether to use weak references to the receiver. By default, the module will attempt to use weak references to the receiver objects. If this parameter is false, then strong references will be used.
- **dispatch_uid** – An identifier used to uniquely identify a particular instance of a receiver. This will usually be a string, though it may be anything hashable.

**disconnect** (receiver=None, sender=None, weak=True, dispatch_uid=None)

Disconnect receiver from sender for signal.

If weak references are used, disconnect need not be called. The receiver will be removed from dispatch automatically.

**Parameters**

- **receiver** – The registered receiver to disconnect. May be none if dispatch_uid is specified.
- **sender** – The registered sender to disconnect.
- **weak** – The weakref state to disconnect.
- **dispatch_uid** – the unique identifier of the receiver to disconnect

**send** (sender, **named)

Send signal from sender to all connected receivers.

If any receiver raises an error, the error propagates back through send, terminating the dispatch loop, so it is quite possible to not have all receivers called if a raises an error.

**Parameters**

- **sender** – The sender of the signal. Either a specific object or None.
- **named** – Named arguments which will be passed to receivers.

**Returns** a list of tuple pairs: [(receiver, response), ... ].

**send_robust** (sender, **named)

Send signal from sender to all connected receivers catching errors.

**Parameters**

- **sender** – The sender of the signal. Can be any python object (normally one registered with a connect if you actually want something to occur).
- **named** – Named arguments which will be passed to receivers. These arguments must be a subset of the argument names defined in providing_args.

**Returns** a list of tuple pairs: [(receiver, response), ... ].

**Raises** DispatcherKeyError

if any receiver raises an error (specifically any subclass of Exception), the error instance is returned as the result for that receiver.

**11.5.48 celery.utils.dispatch.saferef**

“Safe weakrefs”, originally from pyDispatcher.

Provides a way to safely weakref any function, including bound methods (which aren’t handled by the core weakref module).

**class celery.utils.dispatch.saferef.BoundMethodWeakref** (target, on_delete=None)

‘Safe’ and reusable weak references to instance methods.

BoundMethodWeakref objects provide a mechanism for referencing a bound method without requiring that the method object itself (which is normally a transient object) is kept alive. Instead, the BoundMethodWeakref object keeps weak references to both the object and the function which together define the instance method.
key
the identity key for the reference, calculated by the class’s calculate_key() method applied to the
target instance method

deletion_methods
sequence of callable objects taking single argument, a reference to this object which will be called when
either the target object or target function is garbage collected (i.e. when this object becomes invalid).
These are specified as the on_delete parameters of safe_ref() calls.

weak_self
weak reference to the target object

weak_func
weak reference to the target function

_all_instances
class attribute pointing to all live BoundMethodWeakref objects indexed by the class’s calculate_key(target) method applied to the target objects. This weak value dictionary is used to short-circuit creation so that multiple references to the same (object, function) pair produce the same BoundMethodWeakref instance.

classmethod calculate_key(target)
Calculate the reference key for this reference
Currently this is a two-tuple of the id()'s of the target object and the target function respectively.

class celery.utils.dispatch.saferef.BoundNonDescriptorMethodWeakref (target, on_delete=None)
A specialized BoundMethodWeakref, for platforms where instance methods are not descriptors.

It assumes that the function name and the target attribute name are the same, instead of assuming that the
function is a descriptor. This approach is equally fast, but not 100% reliable because functions can be stored on
an attribute named differently than the function’s name such as in:

```python
>>> class A(object):
...     pass

>>> def foo(self):
...     return "foo"

>>> A.bar = foo
```

But this shouldn’t be a common use case. So, on platforms where methods aren’t descriptors (such as Jython)
this implementation has the advantage of working in the most cases.

celery.utils.dispatch.saferef.get_bound_method_weakref (target, on_delete)
Instantiates the appropriate BoundMethodWeakRef, depending on the details of the underlying class method
implementation.

celery.utils.dispatch.saferef.safe_ref (target, on_delete=None)
Return a safe weak reference to a callable target

Parameters
- target – the object to be weakly referenced, if it’s a bound method reference, will create
  a BoundMethodWeakref, otherwise creates a simple weakref.ref.
- on_delete – if provided, will have a hard reference stored to the callable to be
called after the safe reference goes out of scope with the reference object, (either a
weakref.ref or a BoundMethodWeakref) as argument.
11.5.49 celery.platforms

```python
class celery.platforms.DaemonContext (pidfile=None, working_directory='/', umask=0, **kwargs):

close()

detach()

open()

exception celery.platforms.LockFailed

class celery.platforms.PIDFile (path):

    acquire()

    is_locked()

    read_pid()

    release()

    remove()

    remove_if_stale()

    write_pid()

celery.platforms.create_daemon_context (logfile=None, pidfile=None, uid=None, gid=None, **options)

celery.platforms.create_pidlock (pidfile)

    Create and verify pidfile.

    If the pidfile already exists the program exits with an error message, however if the process it refers to is not running anymore, the pidfile is just deleted.

celery.platforms.get_fdmax (default=None)

celery.platforms.get_signal (signal_name)

    Get signal number from signal name.

celery.platforms.ignore_signal (signal_name)

    Ignore signal using SIG_IGN.

    Does nothing if the platform doesn’t support signals, or the specified signal in particular.

celery.platforms.install_signal_handler (signal_name, handler)

    Install a handler.

    Does nothing if the current platform doesn’t support signals, or the specified signal in particular.

celery.platforms.parse_gid (gid)

    Parse group id.

    gid can be an integer (gid) or a string (group name), if a group name the gid is taken from the password file.

celery.platforms.parse_uid (uid)

    Parse user id.

    uid can be an integer (uid) or a string (username), if a username the uid is taken from the password file.

celery.platforms.reset_signal (signal_name)

    Reset signal to the default signal handler.
```
Does nothing if the platform doesn’t support signals, or the specified signal in particular.

```python
celery.platforms.set_effective_user(uid=None, gid=None)
```
Change process privileges to new user/group.

- If uid and gid is set the effective user/group is set.
- If only uid is set, the effective user is set, and the group is set to the user’s primary group.
- If only gid is set, the effective group is set.

```python
celery.platforms.set_mp_process_title(progname, info=None, hostname=None)
```
Set the ps name using the multiprocessing process name.

- Only works if `setproctitle` is installed.

```python
celery.platforms.set_process_title(progname, info=None)
```
Set the ps name for the currently running process.

- Only works if `setproctitle` is installed.

```python
celery.platforms.setegid(gid)
```
Set effective group id.

```python
celery.platforms.seteuid(uid)
```
Set effective user id.

```python
celery.platforms.setgid(gid)
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```python
celery.platforms.setuid(uid)
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