Luigi Documentation

Release 2.8.13

The Luigi Authors

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Contents

Luigi is a Python (2.7, 3.6, 3.7 tested) package that helps you build complex pipelines of batch jobs. It handles dependency resolution, workflow management, visualization, handling failures, command line integration, and much more.

Run `pip install luigi` to install the latest stable version from PyPI. Documentation for the latest release is hosted on readthedocs.

Run `pip install luigi[toml]` to install Luigi with TOML-based configs support.

For the bleeding edge code, `pip install git+https://github.com/spotify/luigi.git`. Bleeding edge documentation is also available.

CHAPTER 1

Background

The purpose of Luigi is to address all the plumbing typically associated with long-running batch processes. You want to chain many tasks, automate them, and failures *will* happen. These tasks can be anything, but are typically long running things like Hadoop jobs, dumping data to/from databases, running machine learning algorithms, or anything else.

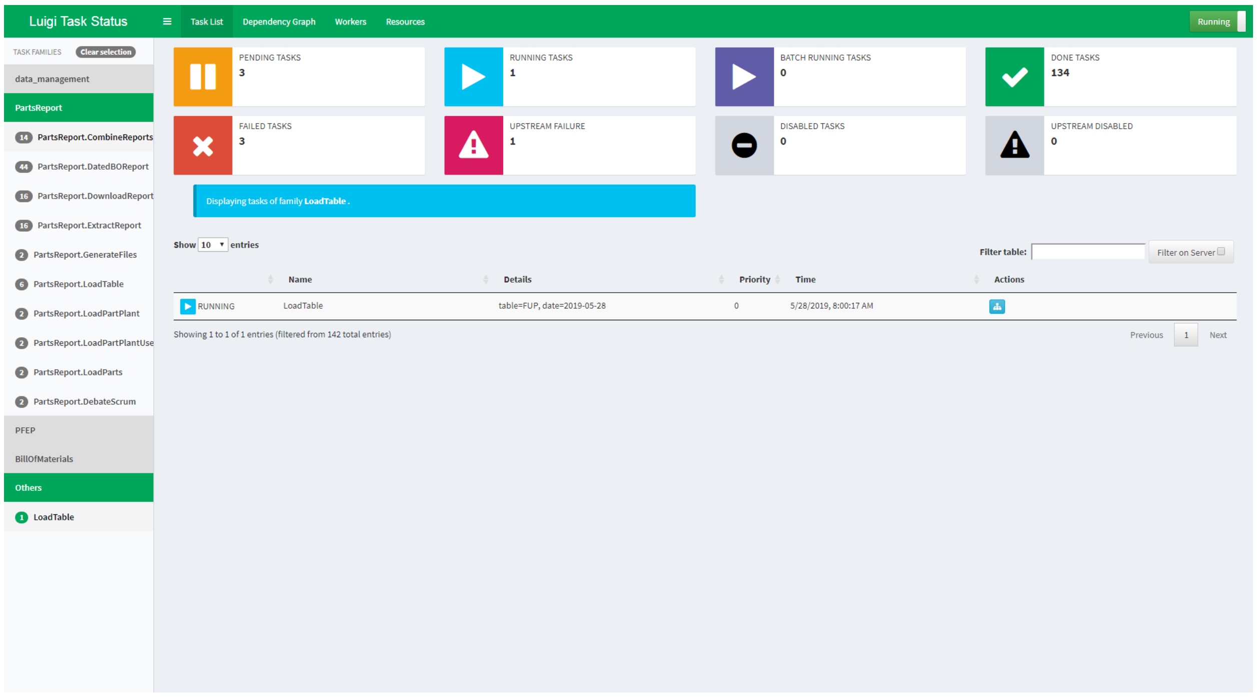
There are other software packages that focus on lower level aspects of data processing, like Hive, Pig, or Cascading. Luigi is not a framework to replace these. Instead it helps you stitch many tasks together, where each task can be a Hive query, a Hadoop job in Java, a Spark job in Scala or Python, a Python snippet, dumping a table from a database, or anything else. It's easy to build up long-running pipelines that comprise thousands of tasks and take days or weeks to complete. Luigi takes care of a lot of the workflow management so that you can focus on the tasks themselves and their dependencies.

You can build pretty much any task you want, but Luigi also comes with a *toolbox* of several common task templates that you use. It includes support for running Python mapreduce jobs in Hadoop, as well as Hive, and Pig, jobs. It also comes with file system abstractions for HDFS, and local files that ensures all file system operations are atomic. This is important because it means your data pipeline will not crash in a state containing partial data.

CHAPTER 2

Visualiser page

The Luigi server comes with a web interface too, so you can search and filter among all your tasks.



Displaying tasks of family **LoadTable** .

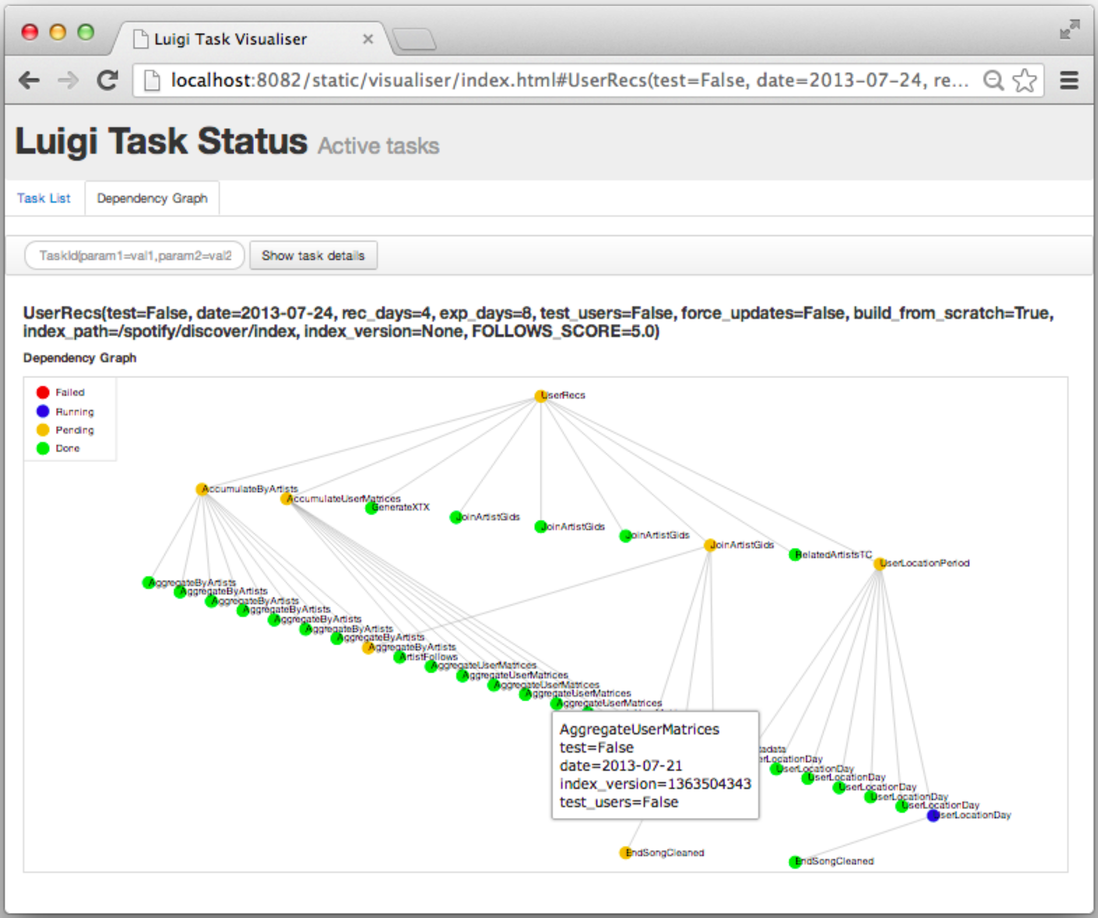
	Name	Details	Priority	Time	Actions
RUNNING	LoadTable	table=FUP, date=2019-05-28	0	5/28/2019, 8:00:17 AM	

Showing 1 to 1 of 1 entries (filtered from 142 total entries)

CHAPTER 3

Dependency graph example

Just to give you an idea of what Luigi does, this is a screen shot from something we are running in production. Using Luigi's visualiser, we get a nice visual overview of the dependency graph of the workflow. Each node represents a task which has to be run. Green tasks are already completed whereas yellow tasks are yet to be run. Most of these tasks are Hadoop jobs, but there are also some things that run locally and build up data files.



Luigi Task Status Active tasks

UserRecs(test=False, date=2013-07-24, rec_days=4, exp_days=8, test_users=False, force_updates=False, build_from_scratch=True, index_path=/spotify/discover/index, index_version=None, FOLLOWS_SCORE=5.0)

Dependency Graph

AggregateUserMatrices
test=False
date=2013-07-21
index_version=1363504343
test_users=False

CHAPTER 4

Philosophy

Conceptually, Luigi is similar to GNU Make where you have certain tasks and these tasks in turn may have dependencies on other tasks. There are also some similarities to Oozie and Azkaban. One major difference is that Luigi is not just built specifically for Hadoop, and it's easy to extend it with other kinds of tasks.

Everything in Luigi is in Python. Instead of XML configuration or similar external data files, the dependency graph is specified *within Python*. This makes it easy to build up complex dependency graphs of tasks, where the dependencies can involve date algebra or recursive references to other versions of the same task. However, the workflow can trigger things not in Python, such as running Pig scripts or scp'ing files.

CHAPTER 5

Who uses Luigi?

We use Luigi internally at Spotify to run thousands of tasks every day, organized in complex dependency graphs. Most of these tasks are Hadoop jobs. Luigi provides an infrastructure that powers all kinds of stuff including recommendations, toplists, A/B test analysis, external reports, internal dashboards, etc.

Since Luigi is open source and without any registration walls, the exact number of Luigi users is unknown. But based on the number of unique contributors, we expect hundreds of enterprises to use it. Some users have written blog posts or held presentations about Luigi:

- Spotify (presentation, 2014)
- Foursquare (presentation, 2013)
- Mortar Data (Datadog) (documentation / tutorial)
- Stripe (presentation, 2014)
- Buffer (blog, 2014)
- SeatGeek (blog, 2015)
- Treasure Data (blog, 2015)
- Growth Intelligence (presentation, 2015)
- AdRoll (blog, 2015)
- 17zuoye (presentation, 2015)
- Custobar (presentation, 2016)
- Blendle (presentation)
- TrustYou (presentation, 2015)
- Groupon / OrderUp (alternative implementation)
- Red Hat - Marketing Operations (blog, 2017)
- GetNinjas (blog, 2017)
- voyages-sncf.com (presentation, 2017)

- Open Targets (blog, 2017)
- Leipzig University Library (presentation, 2016) / (project)
- Synetiq (presentation, 2017)
- Glossier (blog, 2018)
- Data Revenue (blog, 2018)
- Uppsala University (tutorial) / (presentation, 2015) / (slides, 2015) / (poster, 2015) / (paper, 2016) / (project)
- GIPHY (blog, 2019)
- xtream (blog, 2019)
- CIAN (presentation, 2019)

Some more companies are using Luigi but haven't had a chance yet to write about it:

- Schibsted
- enbrite.ly
- Dow Jones / The Wall Street Journal
- Hotels.com
- Newsela
- Squarespace
- OAO
- Grovo
- Weebly
- Deloitte
- Stacktome
- LINX+Neemu+Chaordic
- Foxberry
- Okko
- ISVWorld
- Big Data
- Movio
- Bonnier News
- Starsky Robotics
- BaseTIS
- Hopper
- VOYAGE GROUP/Zucks
- Textpert
- Whizar
- xtream
- Skyscanner

- Jodel
- Mekar
- M3

We’re more than happy to have your company added here. Just send a PR on GitHub.

CHAPTER 6

External links

- Mailing List for discussions and asking questions. (Google Groups)
- Releases (PyPI)
- Source code (GitHub)
- Hubot Integration plugin for Slack, Hipchat, etc (GitHub)

CHAPTER 7

Authors

Luigi was built at Spotify, mainly by Erik Bernhardsson and Elias Freider. Many other people have contributed since open sourcing in late 2012. Arash Rouhani is currently the chief maintainer of Luigi.

CHAPTER 8

Table of Contents

8.1 Example – Top Artists

This is a very simplified case of something we do at Spotify a lot. All user actions are logged to Google Cloud Storage (previously HDFS) where we run a bunch of processing jobs to transform the data. The processing code itself is implemented in a scalable data processing framework, such as Scio, Scalding, or Spark, but the jobs are orchestrated with Luigi. At some point we might end up with a smaller data set that we can bulk ingest into Cassandra, Postgres, or other storage suitable for serving or exploration.

For the purpose of this exercise, we want to aggregate all streams, find the top 10 artists and then put the results into Postgres.

This example is also available in examples/top_artists.py.

8.1.1 Step 1 - Aggregate Artist Streams

```
class AggregateArtists(luigi.Task):
    date_interval = luigi.DateIntervalParameter()

    def output(self):
        return luigi.LocalTarget("data/artist_streams_%s.tsv" % self.date_interval)

    def requires(self):
        return [Streams(date) for date in self.date_interval]

    def run(self):
        artist_count = defaultdict(int)

        for input in self.input():
            with input.open('r') as in_file:
                for line in in_file:
                    timestamp, artist, track = line.strip().split()
                    artist_count[artist] += 1
```

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```
        with self.output().open('w') as out_file:
            for artist, count in artist_count.iteritems():
                print >> out_file, artist, count
```

Note that this is just a portion of the file `examples/top_artists.py`. In particular, `Streams` is defined as a `Task`, acting as a dependency for `AggregateArtists`. In addition, `luigi.run()` is called if the script is executed directly, allowing it to be run from the command line.

There are several pieces of this snippet that deserve more explanation.

- Any `Task` may be customized by instantiating one or more `Parameter` objects on the class level.
- The `output()` method tells Luigi where the result of running the task will end up. The path can be some function of the parameters.
- The `requires()` tasks specifies other tasks that we need to perform this task. In this case it's an external dump named *Streams* which takes the date as the argument.
- For plain Tasks, the `run()` method implements the task. This could be anything, including calling subprocesses, performing long running number crunching, etc. For some subclasses of `Task` you don't have to implement the `run` method. For instance, for the `JobTask` subclass you implement a *mapper* and *reducer* instead.
- `LocalTarget` is a built in class that makes it easy to read/write from/to the local filesystem. It also makes all file operations atomic, which is nice in case your script crashes for any reason.

8.1.2 Running this Locally

Try running this using eg.

```
$ cd examples
$ luigi --module top_artists AggregateArtists --local-scheduler --date-interval 2012-
↪06
```

Note that *top_artists* needs to be in your PYTHONPATH, or else this can produce an error (*ImportError: No module named top_artists*). Add the current working directory to the command PYTHONPATH with:

```
$ PYTHONPATH='.' luigi --module top_artists AggregateArtists --local-scheduler --date-
↪interval 2012-06
```

You can also try to view the manual using `--help` which will give you an overview of the options.

Running the command again will do nothing because the output file is already created. In that sense, any task in Luigi is *idempotent* because running it many times gives the same outcome as running it once. Note that unlike Makefile, the output will not be recreated when any of the input files is modified. You need to delete the output file manually.

The `--local-scheduler` flag tells Luigi not to connect to a scheduler server. This is not recommended for other purpose than just testing things.

8.1.3 Step 1b - Aggregate artists with Spark

While Luigi can process data inline, it is normally used to orchestrate external programs that perform the actual processing. In this example, we will demonstrate how top artists instead can be read from HDFS and calculated with Spark, orchestrated by Luigi.

```
class AggregateArtistsSpark(luigi.contrib.spark.SparkSubmitTask):
    date_interval = luigi.DateIntervalParameter()

    app = 'top_artists_spark.py'
    master = 'local[*]'

    def output(self):
        return luigi.contrib.hdfs.HdfsTarget("data/artist_streams_%s.tsv" % self.date_
↪interval)

    def requires(self):
        return [StreamsHdfs(date) for date in self.date_interval]

    def app_options(self):
        # :func:`~luigi.task.Task.input` returns the targets produced by the tasks in
        # `~luigi.task.Task.requires`.
        return [','.join([p.path for p in self.input()]),
                self.output().path]
```

`luigi.contrib.hadoop.SparkSubmitTask` doesn't require you to implement a *run()* method. Instead, you specify the command line parameters to send to `spark-submit`, as well as any other configuration specific to Spark.

Python code for the Spark job is found below.

```
import operator
import sys
from pyspark.sql import SparkSession


def main(argv):
    input_paths = argv[1].split(',')
    output_path = argv[2]

    spark = SparkSession.builder.getOrCreate()

    streams = spark.read.option('sep', '\t').csv(input_paths[0])
    for stream_path in input_paths[1:]:
        streams.union(spark.read.option('sep', '\t').csv(stream_path))

    # The second field is the artist
    counts = streams \
        .map(lambda row: (row[1], 1)) \
        .reduceByKey(operator.add)

    counts.write.option('sep', '\t').csv(output_path)


if __name__ == '__main__':
    sys.exit(main(sys.argv))
```

In a typical deployment scenario, the Luigi orchestration definition above as well as the Pyspark processing code would be packaged into a deployment package, such as a container image. The processing code does not have to be implemented in Python, any program can be packaged in the image and run from Luigi.

8.1.4 Step 2 – Find the Top Artists

At this point, we've counted the number of streams for each artists, for the full time period. We are left with a large file that contains mappings of artist -> count data, and we want to find the top 10 artists. Since we only have a few hundred thousand artists, and calculating artists is nontrivial to parallelize, we choose to do this not as a Hadoop job, but just as a plain old for-loop in Python.

```
class Top10Artists(luigi.Task):
    date_interval = luigi.DateIntervalParameter()
    use_hadoop = luigi.BoolParameter()

    def requires(self):
        if self.use_hadoop:
            return AggregateArtistsSpark(self.date_interval)
        else:
            return AggregateArtists(self.date_interval)

    def output(self):
        return luigi.LocalTarget("data/top_artists_%s.tsv" % self.date_interval)

    def run(self):
        top_10 = nlargest(10, self._input_iterator())
        with self.output().open('w') as out_file:
            for streams, artist in top_10:
                print >> out_file, self.date_interval.date_a, self.date_interval.date_
↪b, artist, streams

    def _input_iterator(self):
        with self.input().open('r') as in_file:
            for line in in_file:
                artist, streams = line.strip().split()
                yield int(streams), int(artist)
```

The most interesting thing here is that this task (*Top10Artists*) defines a dependency on the previous task (*AggregateArtists*). This means that if the output of *AggregateArtists* does not exist, the task will run before *Top10Artists*.

```
$ luigi --module examples.top_artists Top10Artists --local-scheduler --date-interval␣
↪2012-07
```

This will run both tasks.

8.1.5 Step 3 - Insert into Postgres

This mainly serves as an example of a specific subclass *Task* that doesn't require any code to be written. It's also an example of how you can define task templates that you can reuse for a lot of different tasks.

```
class ArtistToplistToDatabase(luigi.contrib.postgres.CopyToTable):
    date_interval = luigi.DateIntervalParameter()
    use_hadoop = luigi.BoolParameter()

    host = "localhost"
    database = "toplists"
    user = "luigi"
    password = "abc123"  # ;)
    table = "top10"

```

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```
    columns = [("date_from", "DATE"),
               ("date_to", "DATE"),
               ("artist", "TEXT"),
               ("streams", "INT")]

    def requires(self):
        return Top10Artists(self.date_interval, self.use_hadoop)
```

Just like previously, this defines a recursive dependency on the previous task. If you try to build the task, that will also trigger building all its upstream dependencies.

8.1.6 Using the Central Planner

The `--local-scheduler` flag tells Luigi not to connect to a central scheduler. This is recommended in order to get started and or for development purposes. At the point where you start putting things in production we strongly recommend running the central scheduler server. In addition to providing locking so that the same task is not run by multiple processes at the same time, this server also provides a pretty nice visualization of your current work flow.

If you drop the `--local-scheduler` flag, your script will try to connect to the central planner, by default at localhost port 8082. If you run

```
$ luigid
```

in the background and then run your task without the `--local-scheduler` flag, then your script will now schedule through a centralized server. You need Tornado for this to work.

Launching http://localhost:8082 should show something like this:

Web server screenshot Looking at the dependency graph for any of the tasks yields something like this:

Aggregate artists screenshot

In production, you'll want to run the centralized scheduler. See: *Using the Central Scheduler* for more information.

8.2 Building workflows

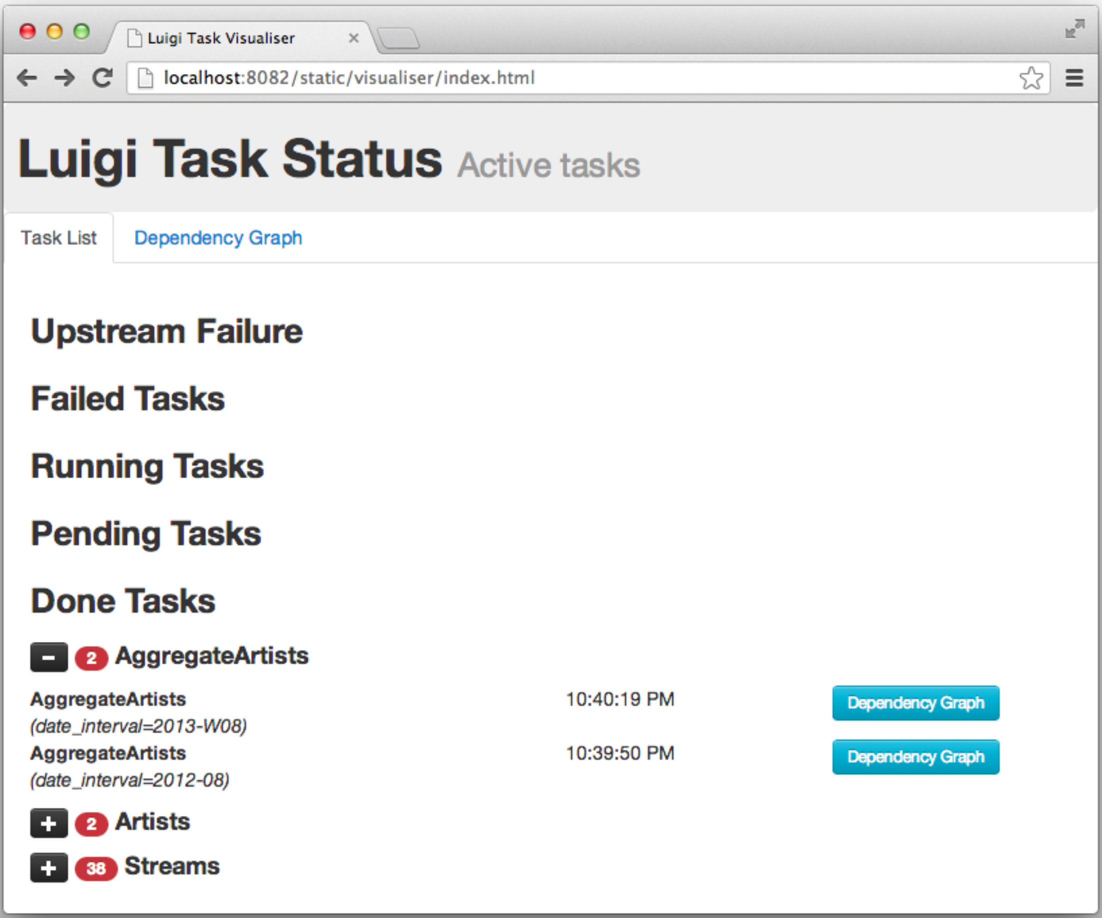
There are two fundamental building blocks of Luigi - the `Task` class and the `Target` class. Both are abstract classes and expect a few methods to be implemented. In addition to those two concepts, the `Parameter` class is an important concept that governs how a Task is run.

8.2.1 Target

The `Target` class corresponds to a file on a disk, a file on HDFS or some kind of a checkpoint, like an entry in a database. Actually, the only method that Targets have to implement is the *exists* method which returns True if and only if the Target exists.

In practice, implementing Target subclasses is rarely needed. Luigi comes with a toolbox of several useful Targets. In particular, `LocalTarget` and `HdfsTarget`, but there is also support for other file systems: `luigi.contrib.s3.S3Target`, `luigi.contrib.ssh.RemoteTarget`, `luigi.contrib.ftp.RemoteTarget`, `luigi.contrib.mysqldb.MySqlTarget`, `luigi.contrib.redshift.RedshiftTarget`, and several more.

Most of these targets, are file system-like. For instance, `LocalTarget` and `HdfsTarget` map to a file on the local drive or a file in HDFS. In addition these also wrap the underlying operations to make them atomic. They both



Luigi Task Status Active tasks

Upstream Failure

Failed Tasks

Running Tasks

Pending Tasks

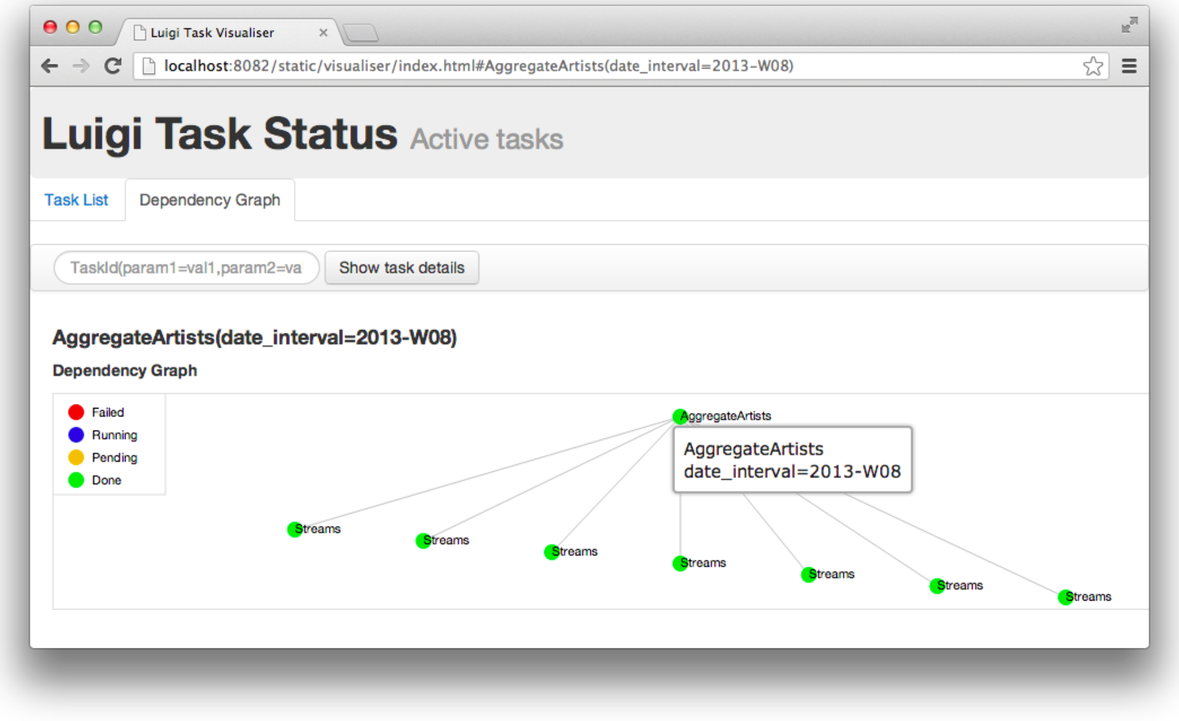
Done Tasks

− 2 AggregateArtists

AggregateArtists *(date_interval=2013-W08)*	10:40:19 PM	Dependency Graph
AggregateArtists *(date_interval=2012-08)*	10:39:50 PM	Dependency Graph

+ 2 Artists

+ 38 Streams


Luigi Task Visualiser
localhost:8082/static/visualiser/index.html#AggregateArtists(date_interval=2013-W08)
Luigi Task Status Active tasks
Task List
Dependency Graph
TaskId(param1=val1,param2=va
Show task details
AggregateArtists(date_interval=2013-W08)
Dependency Graph
Failed
Running
Pending
Done
AggregateArtists
AggregateArtists date_interval=2013-W08
Streams
Streams
Streams
Streams
Streams
Streams
Streams

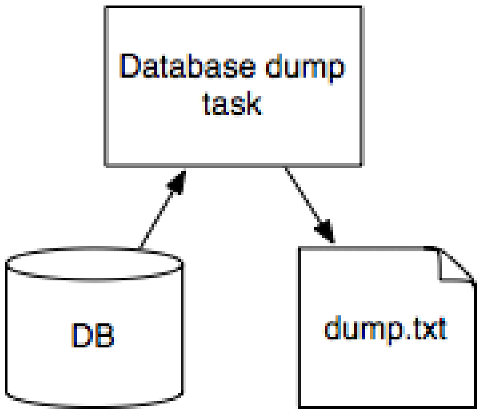
implement the `open()` method which returns a stream object that could be read (`mode='r'`) from or written to (`mode='w'`).

Luigi comes with Gzip support by providing `format=format.Gzip`. Adding support for other formats is pretty simple.

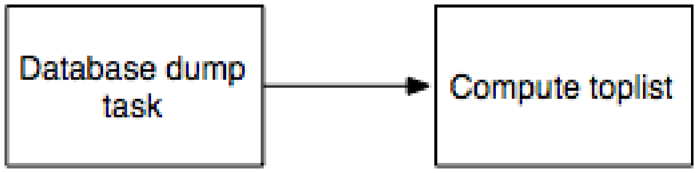
8.2.2 Task

The *`Task`* class is a bit more conceptually interesting because this is where computation is done. There are a few methods that can be implemented to alter its behavior, most notably *`run()`*, *`output()`* and *`requires()`*.

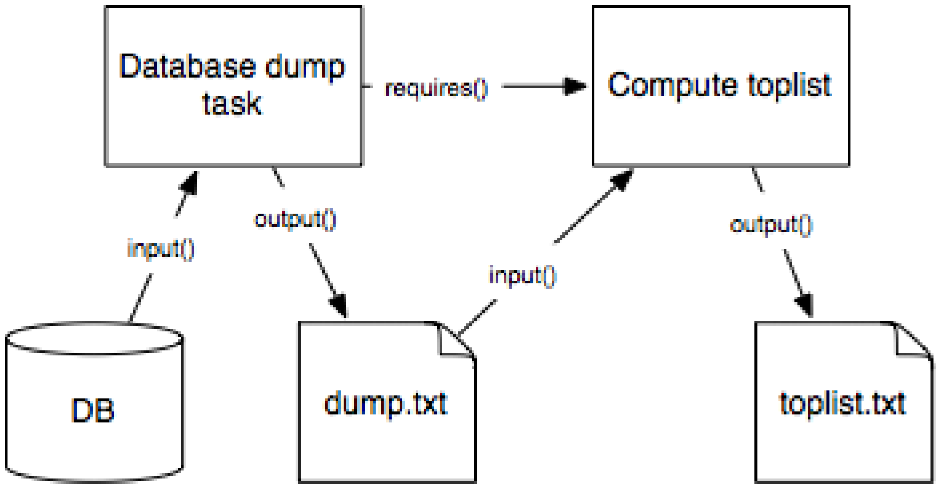
Tasks consume Targets that were created by some other task. They usually also output targets:



You can define dependencies between *Tasks* using the `requires()` method. See *Tasks* for more info.

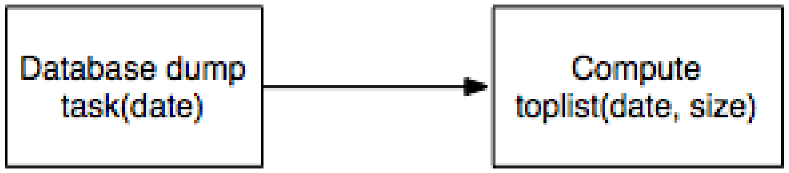


Each task defines its outputs using the `output()` method. Additionally, there is a helper method `input()` that returns the corresponding Target classes for each Task dependency.



8.2.3 Parameter

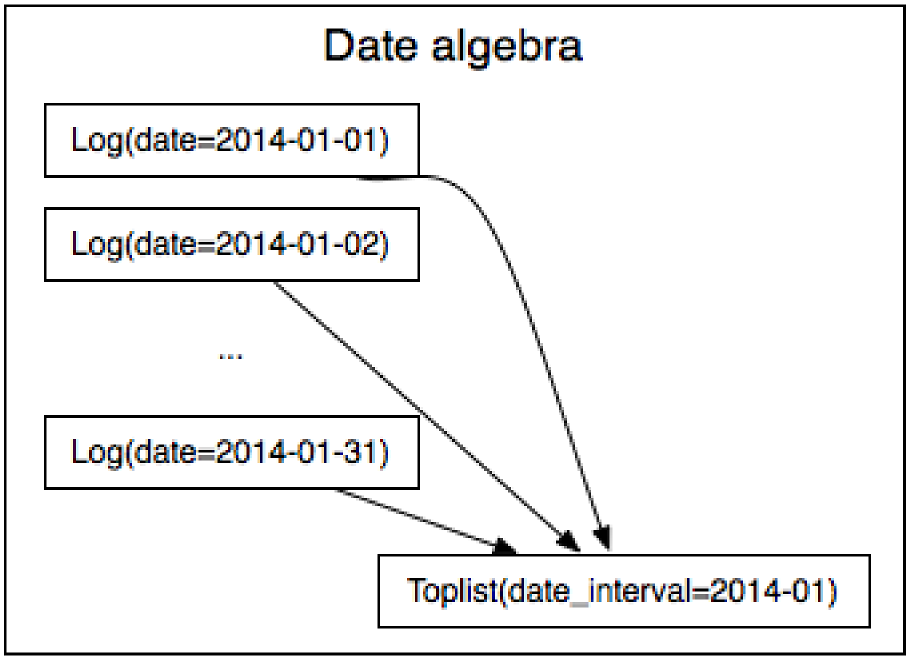
The Task class corresponds to some type of job that is run, but in general you want to allow some form of parameterization of it. For instance, if your Task class runs a Hadoop job to create a report every night, you probably want to make the date a parameter of the class. See *Parameters* for more info.

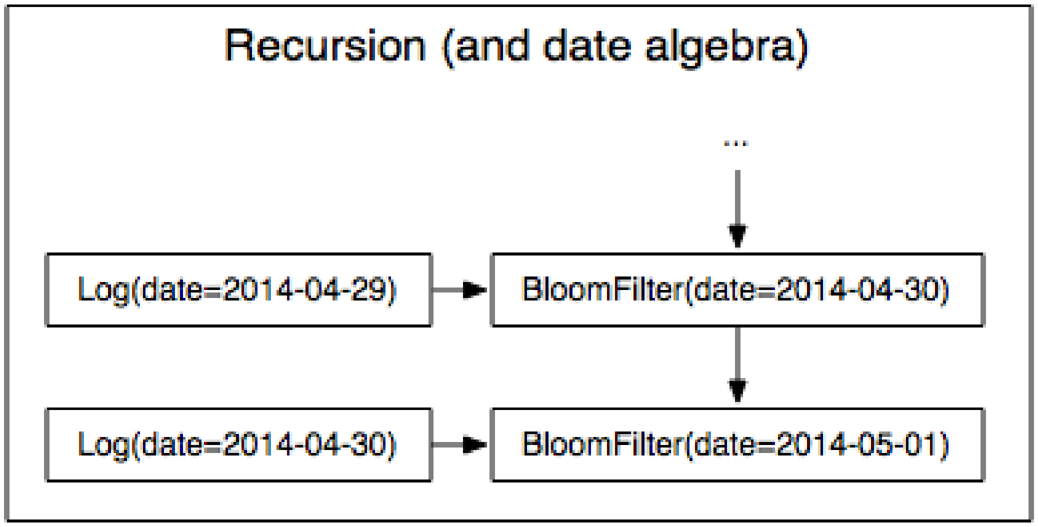


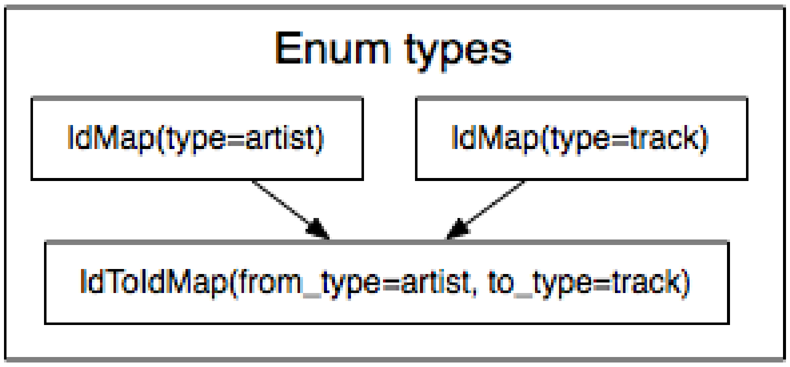
8.2.4 Dependencies

Using tasks, targets, and parameters, Luigi lets you express arbitrary dependencies in *code*, rather than using some kind of awkward config DSL. This is really useful because in the real world, dependencies are often very messy. For instance, some examples of the dependencies you might encounter:

(These diagrams are from a Luigi presentation in late 2014 at NYC Data Science meetup)


Date algebra
Log(date=2014-01-01)
Log(date=2014-01-02)
...
Log(date=2014-01-31)
Toplist(date_interval=2014-01)

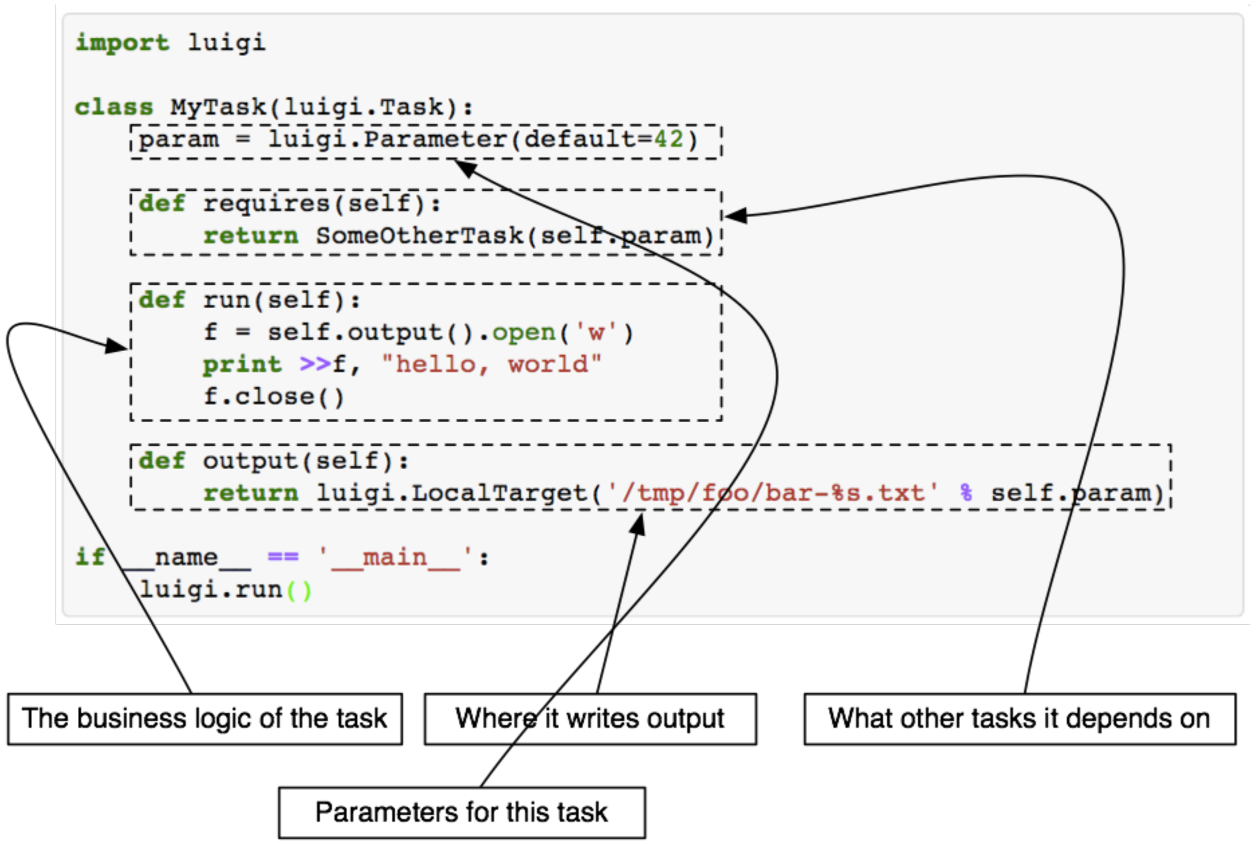

Recursion (and date algebra)
...
Log(date=2014-04-29)
BloomFilter(date=2014-04-30)
Log(date=2014-04-30)
BloomFilter(date=2014-05-01)


Enum types
IdMap(type=artist)
IdMap(type=track)
IdToIdMap(from_type=artist, to_type=track)

8.3 Tasks

Tasks are where the execution takes place. Tasks depend on each other and output targets.

An outline of how a task can look like:



```
import luigi

class MyTask(luigi.Task):
    param = luigi.Parameter(default=42)

    def requires(self):
        return SomeOtherTask(self.param)

    def run(self):
        f = self.output().open('w')
        print >>f, "hello, world"
        f.close()

    def output(self):
        return luigi.LocalTarget('/tmp/foo/bar-%s.txt' % self.param)

if __name__ == '__main__':
    luigi.run()
```

The business logic of the task
Where it writes output
What other tasks it depends on
Parameters for this task

8.3.1 Task.requires

The *requires()* method is used to specify dependencies on other Task object, which might even be of the same class. For instance, an example implementation could be

```
def requires(self):
    return OtherTask(self.date), DailyReport(self.date - datetime.timedelta(1))
```

In this case, the DailyReport task depends on two inputs created earlier, one of which is the same class. requires can return other Tasks in any way wrapped up within dicts/lists/tuples/etc.

8.3.2 Requiring another Task

Note that *requires()* can *not* return a *Target* object. If you have a simple Target object that is created externally you can wrap it in a Task class like this:

```
class LogFiles(luigi.ExternalTask):
    def output(self):
        return luigi.contrib.hdfs.HdfsTarget('/log')
```

This also makes it easier to add parameters:

```
class LogFiles(luigi.ExternalTask):
    date = luigi.DateParameter()
    def output(self):
        return luigi.contrib.hdfs.HdfsTarget(self.date.strftime('/log/%Y-%m-%d'))
```

8.3.3 Task.output

The *output()* method returns one or more *Target* objects. Similarly to requires, you can return them wrapped up in any way that's convenient for you. However we recommend that any *Task* only return one single *Target* in output. If multiple outputs are returned, atomicity will be lost unless the *Task* itself can ensure that each *Target* is atomically created. (If atomicity is not of concern, then it is safe to return multiple *Target* objects.)

```
class DailyReport(luigi.Task):
    date = luigi.DateParameter()
    def output(self):
        return luigi.contrib.hdfs.HdfsTarget(self.date.strftime('/reports/%Y-%m-%d'))
    # ...
```

8.3.4 Task.run

The *run()* method now contains the actual code that is run. When you are using *Task.requires* and *Task.run* Luigi breaks down everything into two stages. First it figures out all dependencies between tasks, then it runs everything. The *input()* method is an internal helper method that just replaces all Task objects in requires with their corresponding output. An example:

```
class GenerateWords(luigi.Task):

    def output(self):
        return luigi.LocalTarget('words.txt')

    def run(self):

        # write a dummy list of words to output file
        words = [
                'apple',
                'banana',
                'grapefruit'
                ]

        with self.output().open('w') as f:
            for word in words:
                f.write('{word}\n'.format(word=word))


class CountLetters(luigi.Task):

    def requires(self):
```

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```
        return GenerateWords()

    def output(self):
        return luigi.LocalTarget('letter_counts.txt')

    def run(self):

        # read in file as list
        with self.input().open('r') as infile:
            words = infile.read().splitlines()

        # write each word to output file with its corresponding letter count
        with self.output().open('w') as outfile:
            for word in words:
                outfile.write(
                        '{word} | {letter_count}\n'.format(
                            word=word,
                            letter_count=len(word)
                            )
                        )
```

It's useful to note that if you're writing to a binary file, Luigi automatically strips the `'b'` flag due to how atomic writes/reads work. In order to write a binary file, such as a pickle file, you should instead use `format=Nop` when calling LocalTarget. Following the above example:

```
class GenerateWords(luigi.Task):

    def output(self):
        return luigi.LocalTarget('words.pckl', format=Nop)

    def run(self):
        import pickle

        # write a dummy list of words to output file
        words = [
                'apple',
                'banana',
                'grapefruit'
                ]

        with self.output().open('w') as f:
            pickle.dump(words, f)
```

8.3.5 Task.input

As seen in the example above, *`input()`* is a wrapper around *Task.requires* that returns the corresponding Target objects instead of Task objects. Anything returned by *Task.requires* will be transformed, including lists, nested dicts, etc. This can be useful if you have many dependencies:

```
class TaskWithManyInputs(luigi.Task):
    def requires(self):
        return {'a': TaskA(), 'b': [TaskB(i) for i in xrange(100)]}

    def run(self):
```

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```
        f = self.input()['a'].open('r')
        g = [y.open('r') for y in self.input()['b']]
```

8.3.6 Dynamic dependencies

Sometimes you might not know exactly what other tasks to depend on until runtime. In that case, Luigi provides a mechanism to specify dynamic dependencies. If you yield another `Task` in the *Task.run* method, the current task will be suspended and the other task will be run. You can also yield a list of tasks.

```
class MyTask(luigi.Task):
    def run(self):
        other_target = yield OtherTask()

        # dynamic dependencies resolve into targets
        f = other_target.open('r')
```

This mechanism is an alternative to *Task.requires* in case you are not able to build up the full dependency graph before running the task. It does come with some constraints: the *Task.run* method will resume from scratch each time a new task is yielded. In other words, you should make sure your *Task.run* method is idempotent. (This is good practice for all Tasks in Luigi, but especially so for tasks with dynamic dependencies).

For an example of a workflow using dynamic dependencies, see examples/dynamic_requirements.py.

8.3.7 Task status tracking

For long-running or remote tasks it is convenient to see extended status information not only on the command line or in your logs but also in the GUI of the central scheduler. Luigi implements dynamic status messages, progress bar and tracking urls which may point to an external monitoring system. You can set this information using callbacks within *Task.run*:

```
class MyTask(luigi.Task):
    def run(self):
        # set a tracking url
        self.set_tracking_url("http://...")

        # set status messages during the workload
        for i in range(100):
            # do some hard work here
            if i % 10 == 0:
                self.set_status_message("Progress: %d / 100" % i)
                # displays a progress bar in the scheduler UI
                self.set_progress_percentage(i)
```

8.3.8 Events and callbacks

Luigi has a built-in event system that allows you to register callbacks to events and trigger them from your own tasks. You can both hook into some pre-defined events and create your own. Each event handle is tied to a Task class and will be triggered only from that class or a subclass of it. This allows you to effortlessly subscribe to events only from a specific class (e.g. for hadoop jobs).

```
@luigi.Task.event_handler(luigi.Event.SUCCESS)
def celebrate_success(task):
    """Will be called directly after a successful execution
       of `run` on any Task subclass (i.e. all luigi Tasks)
    """
    ...

@luigi.contrib.hadoop.JobTask.event_handler(luigi.Event.FAILURE)
def mourn_failure(task, exception):
    """Will be called directly after a failed execution
       of `run` on any JobTask subclass
    """
    ...

luigi.run()
```

8.3.9 But I just want to run a Hadoop job?

The Hadoop code is integrated in the rest of the Luigi code because we really believe almost all Hadoop jobs benefit from being part of some sort of workflow. However, in theory, nothing stops you from using the `JobTask` class (and also `HdfsTarget`) without using the rest of Luigi. You can simply run it manually using

```
MyJobTask('abc', 123).run()
```

You can use the hdfs.target.HdfsTarget class anywhere by just instantiating it:

```
t = luigi.contrib.hdfs.target.HdfsTarget('/tmp/test.gz', format=format.Gzip)
f = t.open('w')
# ...
f.close() # needed
```

8.3.10 Task priority

The scheduler decides which task to run next from the set of all tasks that have all their dependencies met. By default, this choice is pretty arbitrary, which is fine for most workflows and situations.

If you want to have some control on the order of execution of available tasks, you can set the `priority` property of a task, for example as follows:

```
# A static priority value as a class constant:
class MyTask(luigi.Task):
    priority = 100
    # ...

# A dynamic priority value with a "@property" decorated method:
class OtherTask(luigi.Task):
    @property
    def priority(self):
        if self.date > some_threshold:
            return 80
        else:
            return 40
    # ...
```

Tasks with a higher priority value will be picked before tasks with a lower priority value. There is no predefined range of priorities, you can choose whatever (int or float) values you want to use. The default value is 0.

Warning: task execution order in Luigi is influenced by both dependencies and priorities, but in Luigi dependencies come first. For example: if there is a task A with priority 1000 but still with unmet dependencies and a task B with priority 1 without any pending dependencies, task B will be picked first.

8.3.11 Namespaces, families and ids

In order to avoid name clashes and to be able to have an identifier for tasks, Luigi introduces the concepts *task_namespace*, *task_family* and *task_id*. The namespace and family operate on class level meanwhile the task id only exists on instance level. The concepts are best illustrated using code.

```
import luigi
class MyTask(luigi.Task):
    my_param = luigi.Parameter()
    task_namespace = 'my_namespace'

my_task = MyTask(my_param='hello')
print(my_task)                      # --> my_namespace.MyTask(my_param=hello)

print(my_task.get_task_namespace()) # --> my_namespace
print(my_task.get_task_family())    # --> my_namespace.MyTask
print(my_task.task_id)              # --> my_namespace.MyTask_hello_890907e7ce

print(MyTask.get_task_namespace())  # --> my_namespace
print(MyTask.get_task_family())     # --> my_namespace.MyTask
print(MyTask.task_id)               # --> Error!
```

The full documentation for this machinery exists in the `task` module.

8.3.12 Instance caching

In addition to the stuff mentioned above, Luigi also does some metaclass logic so that if e.g. `DailyReport(datetime.date(2012, 5, 10))` is instantiated twice in the code, it will in fact result in the same object. See *Instance caching* for more info

8.4 Parameters

Parameters is the Luigi equivalent of creating a constructor for each Task. Luigi requires you to declare these parameters by instantiating `Parameter` objects on the class scope:

```
class DailyReport(luigi.contrib.hadoop.JobTask):
    date = luigi.DateParameter(default=datetime.date.today())
    # ...
```

By doing this, Luigi can take care of all the boilerplate code that would normally be needed in the constructor. Internally, the DailyReport object can now be constructed by running `DailyReport(datetime.date(2012, 5, 10))` or just `DailyReport()`. Luigi also creates a command line parser that automatically handles the conversion from strings to Python types. This way you can invoke the job on the command line eg. by passing `--date 2012-05-10`.

The parameters are all set to their values on the Task object instance, i.e.

```
d = DailyReport(datetime.date(2012, 5, 10))
print(d.date)
```

will return the same date that the object was constructed with. Same goes if you invoke Luigi on the command line.

8.4.1 Instance caching

Tasks are uniquely identified by their class name and values of their parameters. In fact, within the same worker, two tasks of the same class with parameters of the same values are not just equal, but the same instance:

```
>>> import luigi
>>> import datetime
>>> class DateTask(luigi.Task):
...   date = luigi.DateParameter()
...
>>> a = datetime.date(2014, 1, 21)
>>> b = datetime.date(2014, 1, 21)
>>> a is b
False
>>> c = DateTask(date=a)
>>> d = DateTask(date=b)
>>> c
DateTask(date=2014-01-21)
>>> d
DateTask(date=2014-01-21)
>>> c is d
True
```

8.4.2 Insignificant parameters

If a parameter is created with `significant=False`, it is ignored as far as the Task signature is concerned. Tasks created with only insignificant parameters differing have the same signature but are not the same instance:

```
>>> class DateTask2(DateTask):
...   other = luigi.Parameter(significant=False)
...
>>> c = DateTask2(date=a, other="foo")
>>> d = DateTask2(date=b, other="bar")
>>> c
DateTask2(date=2014-01-21)
>>> d
DateTask2(date=2014-01-21)
>>> c.other
'foo'
>>> d.other
'bar'
>>> c is d
False
>>> hash(c) == hash(d)
True
```

8.4.3 Parameter visibility

Using `ParameterVisibility` you can configure parameter visibility. By default, all parameters are public, but you can also set them hidden or private.

```
>>> import luigi
>>> from luigi.parameter import ParameterVisibility

>>> luigi.Parameter(visibility=ParameterVisibility.PRIVATE)
```

`ParameterVisibility.PUBLIC` (default) - visible everywhere

`ParameterVisibility.HIDDEN` - ignored in WEB-view, but saved into database if save db_history is true

`ParameterVisibility.PRIVATE` - visible only inside task.

8.4.4 Parameter types

In the examples above, the *type* of the parameter is determined by using different subclasses of `Parameter`. There are a few of them, like `DateParameter`, `DateIntervalParameter`, `IntParameter`, `FloatParameter`, etc.

Python is not a statically typed language and you don't have to specify the types of any of your parameters. You can simply use the base class `Parameter` if you don't care.

The reason you would use a subclass like `DateParameter` is that Luigi needs to know its type for the command line interaction. That's how it knows how to convert a string provided on the command line to the corresponding type (i.e. datetime.date instead of a string).

8.4.5 Setting parameter value for other classes

All parameters are also exposed on a class level on the command line interface. For instance, say you have classes TaskA and TaskB:

```
class TaskA(luigi.Task):
    x = luigi.Parameter()

class TaskB(luigi.Task):
    y = luigi.Parameter()
```

You can run `TaskB` on the command line: `luigi TaskB --y 42`. But you can also set the class value of `TaskA` by running `luigi TaskB --y 42 --TaskA-x 43`. This sets the value of `TaskA.x` to 43 on a *class* level. It is still possible to override it inside Python if you instantiate `TaskA(x=44)`.

All parameters can also be set from the configuration file. For instance, you can put this in the config:

```
[TaskA]
x: 45
```

Just as in the previous case, this will set the value of `TaskA.x` to 45 on the *class* level. And likewise, it is still possible to override it inside Python if you instantiate `TaskA(x=44)`.

8.4.6 Parameter resolution order

Parameters are resolved in the following order of decreasing priority:

1. Any value passed to the constructor, or task level value set on the command line (applies on an instance level)
2. Any value set on the command line (applies on a class level)
3. Any configuration option (applies on a class level)
4. Any default value provided to the parameter (applies on a class level)

See the `Parameter` class for more information.

8.5 Running Luigi

8.5.1 Running from the Command Line

The preferred way to run Luigi tasks is through the `luigi` command line tool that will be installed with the pip package.

```
# my_module.py, available in your sys.path
import luigi

class MyTask(luigi.Task):
    x = luigi.IntParameter()
    y = luigi.IntParameter(default=45)

    def run(self):
        print(self.x + self.y)
```

Should be run like this

```
$ luigi --module my_module MyTask --x 123 --y 456 --local-scheduler
```

Or alternatively like this:

```
$ python -m luigi --module my_module MyTask --x 100 --local-scheduler
```

Note that if a parameter name contains '_', it should be replaced by '-'. For example, if MyTask had a parameter called 'my_parameter':

```
$ luigi --module my_module MyTask --my-parameter 100 --local-scheduler
```

Note: Please make sure to always place task parameters behind the task family!

8.5.2 Running from Python code

Another way to start tasks from Python code is using `luigi.build(tasks, worker_scheduler_factory=None, **env_params)` from `luigi.interface` module.

This way of running luigi tasks is useful if you want to get some dynamic parameters from another source, such as database, or provide additional logic before you start tasks.

One notable difference is that `build` defaults to not using the identical process lock. If you want to change this behaviour, just pass `no_lock=False`.

```
class MyTask1(luigi.Task):
    x = luigi.IntParameter()
    y = luigi.IntParameter(default=0)

    def run(self):
        print(self.x + self.y)


class MyTask2(luigi.Task):
    x = luigi.IntParameter()
    y = luigi.IntParameter(default=1)
    z = luigi.IntParameter(default=2)

    def run(self):
        print(self.x * self.y * self.z)


if __name__ == '__main__':
    luigi.build([MyTask1(x=10), MyTask2(x=15, z=3)])
```

Also, it is possible to pass additional parameters to `build` such as host, port, workers and local_scheduler:

```
if __name__ == '__main__':
     luigi.build([MyTask1(x=1)], workers=5, local_scheduler=True)
```

To achieve some special requirements you can pass to `build` your `worker_scheduler_factory` which will return your worker and/or scheduler implementations:

```
class MyWorker(Worker):
    # some custom logic


class MyFactory(object):
  def create_local_scheduler(self):
      return scheduler.Scheduler(prune_on_get_work=True, record_task_history=False)

  def create_remote_scheduler(self, url):
      return rpc.RemoteScheduler(url)

  def create_worker(self, scheduler, worker_processes, assistant=False):
      # return your worker instance
      return MyWorker(
          scheduler=scheduler, worker_processes=worker_processes, assistant=assistant)


if __name__ == '__main__':
    luigi.build([MyTask1(x=1)], worker_scheduler_factory=MyFactory())
```

In some cases (like task queue) it may be useful.

8.5.3 Response of luigi.build()/luigi.run()

- **Default response** By default *luigi.build()/luigi.run()* returns True if there were no scheduling errors. This is the same as the attribute `LuigiRunResult.scheduling_succeeded`.
- **Detailed response** This is a response of type *`LuigiRunResult`*. This is obtained by passing a keyword argument `detailed_summary=True` to *build/run*. This response contains detailed information about the

jobs.

```python
if __name__ == '__main__':
    luigi_run_result = luigi.build(..., detailed_summary=True)
    print(luigi_run_result.summary_text)
```

8.5.4 Luigi on Windows

Most Luigi functionality works on Windows. Exceptions:

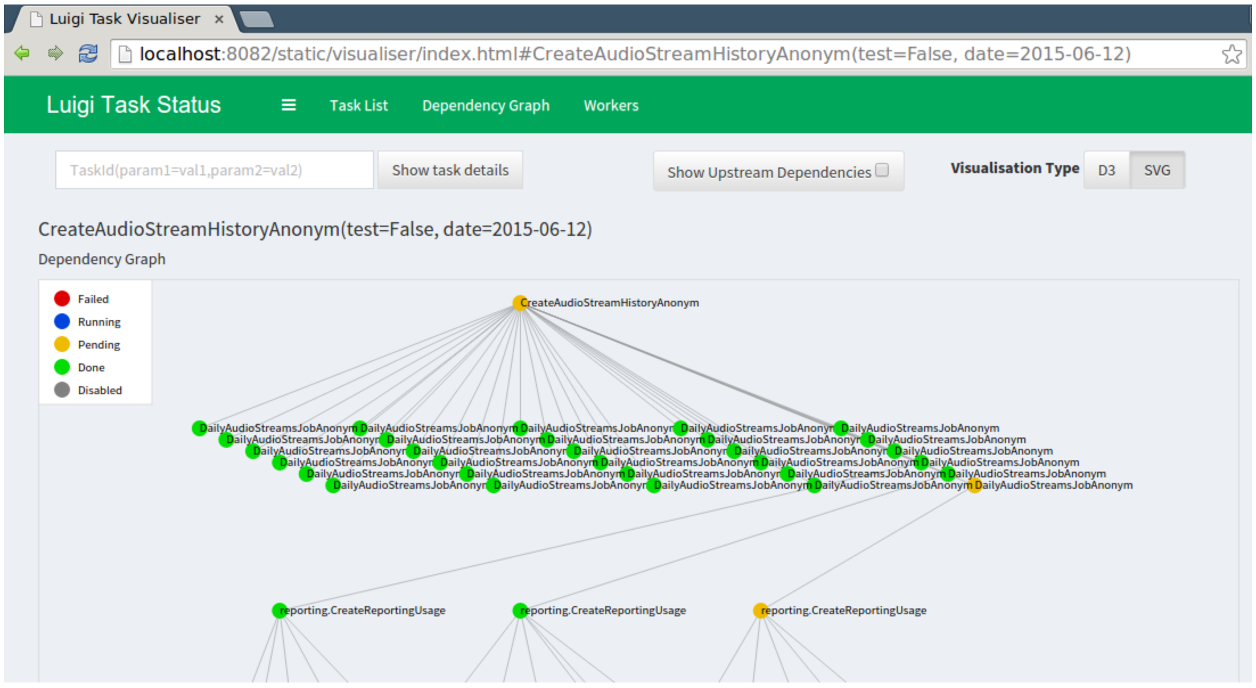
- Specifying multiple worker processes using the `workers` argument for `luigi.build`, or using the `--workers` command line argument. (Similarly, specifying `--worker-force-multiprocessing`). For most programs, this will result in failure (a common sight is `BrokenPipeError`). The reason is that worker processes are assumed to be forked from the main process. Forking is not possible on Windows.
- Running the Luigi central scheduling server as a daemon (i.e. with `--background`). Again, a Unix-only concept.

8.6 Using the Central Scheduler

While the `--local-scheduler` flag is useful for development purposes, it's not recommended for production usage. The centralized scheduler serves two purposes:

- Make sure two instances of the same task are not running simultaneously
- Provide visualization of everything that's going on.

Note that the central scheduler does not execute anything for you or help you with job parallelization. For running tasks periodically, the easiest thing to do is to trigger a Python script from cron or from a continuously running process. There is no central process that automatically triggers jobs. This model may seem limited, but we believe that it makes things far more intuitive and easy to understand.


Luigi Task Visualiser
localhost:8082/static/visualiser/index.html#CreateAudioStreamHistoryAnonym(test=False, date=2015-06-12)
Luigi Task Status
Task List
Dependency Graph
Workers
TaskId(param1=val1,param2=val2)
Show task details
Show Upstream Dependencies
Visualisation Type
D3
SVG
CreateAudioStreamHistoryAnonym(test=False, date=2015-06-12)
Dependency Graph
Failed
Running
Pending
Done
Disabled
CreateAudioStreamHistoryAnonym
DailyAudioStreamsJobAnonym
reporting.CreateReportingUsage
reporting.CreateReportingUsage
reporting.CreateReportingUsage

8.6.1 The luigid server

To run the server as a daemon run:

```
$ luigid --background --pidfile <PATH_TO_PIDFILE> --logdir <PATH_TO_LOGDIR> --state-
↪path <PATH_TO_STATEFILE>
```

Note that this requires `python-daemon`. By default, the server starts on AF_INET and AF_INET6 port `8082` (which can be changed with the `--port` flag) and listens on all IPs. (To use an AF_UNIX socket use the `--unix-socket` flag)

For a full list of configuration options and defaults, see the *scheduler configuration section*. Note that `luigid` uses the same configuration files as the Luigi client (i.e. `luigi.cfg` or `/etc/luigi/client.cfg` by default).

8.6.2 Enabling Task History

Task History is an experimental feature in which additional information about tasks that have been executed are recorded in a relational database for historical analysis. This information is exposed via the Central Scheduler at `/history`.

To enable the task history, specify `record_task_history = True` in the `[scheduler]` section of `luigi.cfg` and specify `db_connection` under `[task_history]`. The `db_connection` string is used to configure the SQLAlchemy engine. When starting up, `luigid` will create all the necessary tables using create_all.

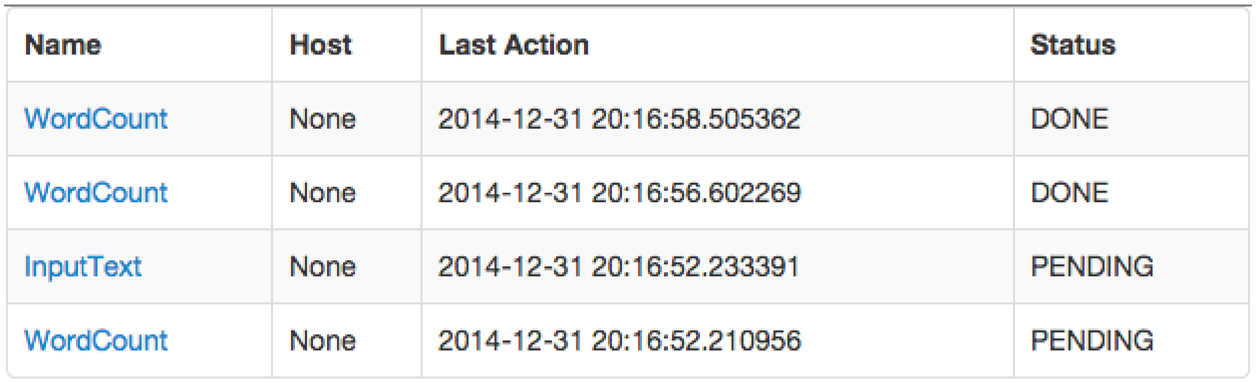
Example configuration

```
[scheduler]
record_task_history = True
state_path = /usr/local/var/luigi-state.pickle

[task_history]
db_connection = sqlite:////usr/local/var/luigi-task-hist.db
```

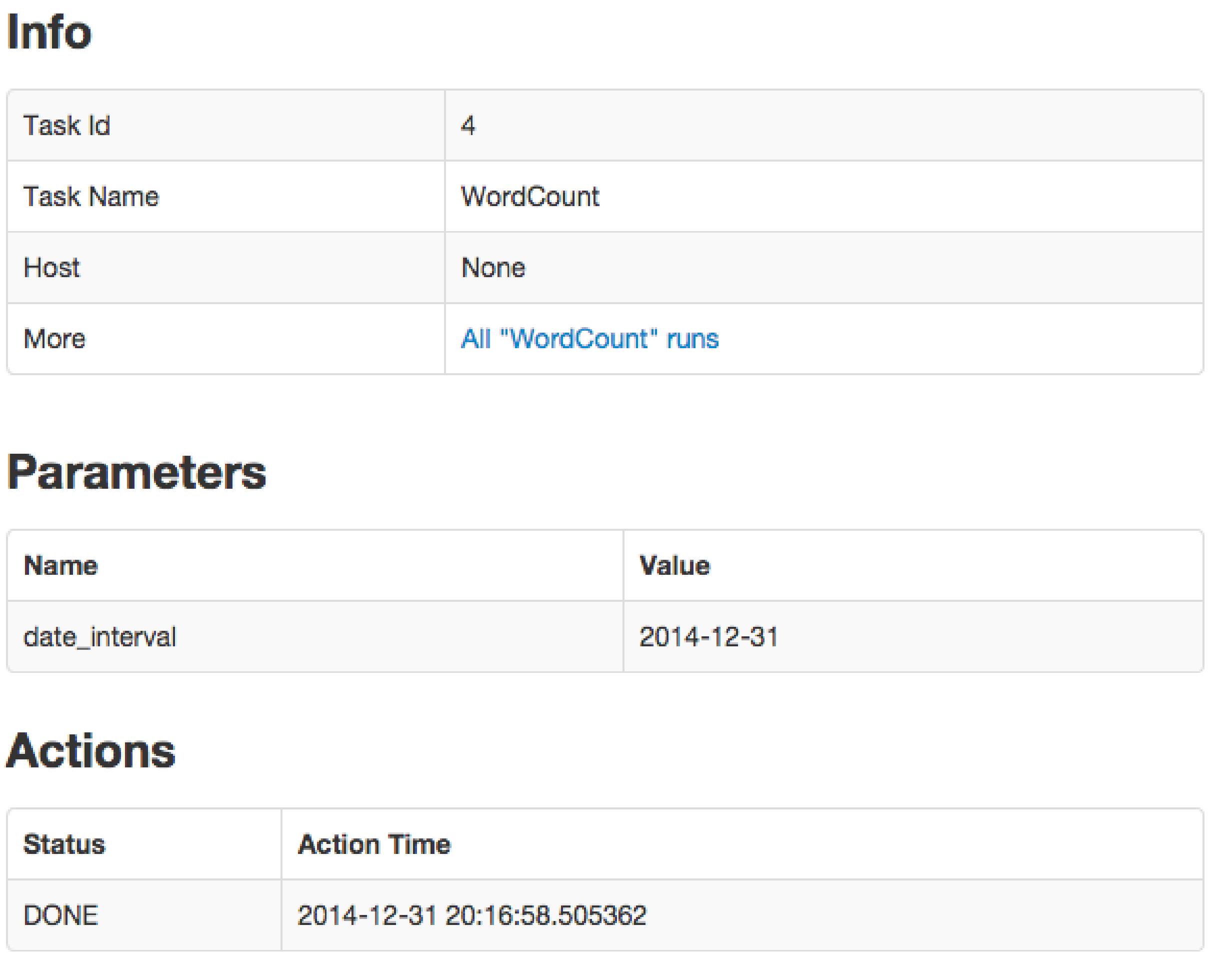
The task history has the following pages:

- `/history` a reverse-cronological listing of runs from the past 24 hours. Example screenshot:



Name	Host	Last Action	Status
WordCount	None	2014-12-31 20:16:58.505362	DONE
WordCount	None	2014-12-31 20:16:56.602269	DONE
InputText	None	2014-12-31 20:16:52.233391	PENDING
WordCount	None	2014-12-31 20:16:52.210956	PENDING

- `/history/by_id/:id` detailed information about a run, including: parameter values, the host on which it ran, and timing information. Example screenshot:
- `/history/by_name/:name` a listing of all runs of a task with the given task name. Example screenshot:



Info

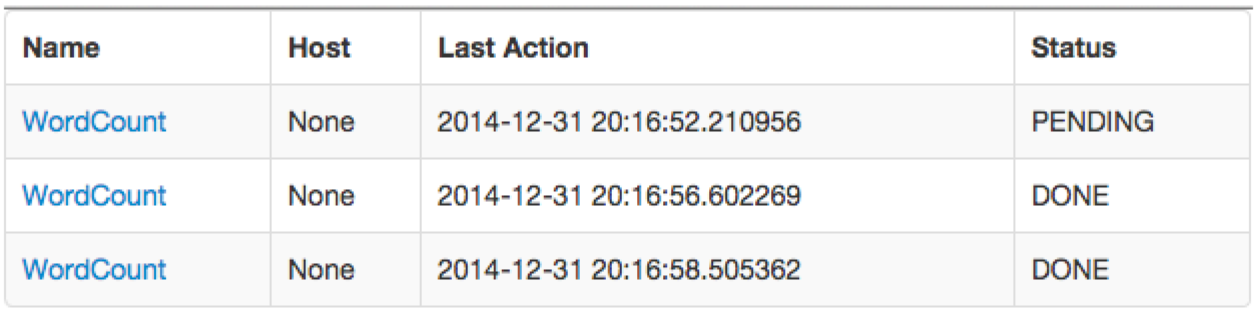
Task Id	4
Task Name	WordCount
Host	None
More	All "WordCount" runs

Parameters

Name	Value
date_interval	2014-12-31

Actions

Status	Action Time
DONE	2014-12-31 20:16:58.505362



Name	Host	Last Action	Status
WordCount	None	2014-12-31 20:16:52.210956	PENDING
WordCount	None	2014-12-31 20:16:56.602269	DONE
WordCount	None	2014-12-31 20:16:58.505362	DONE

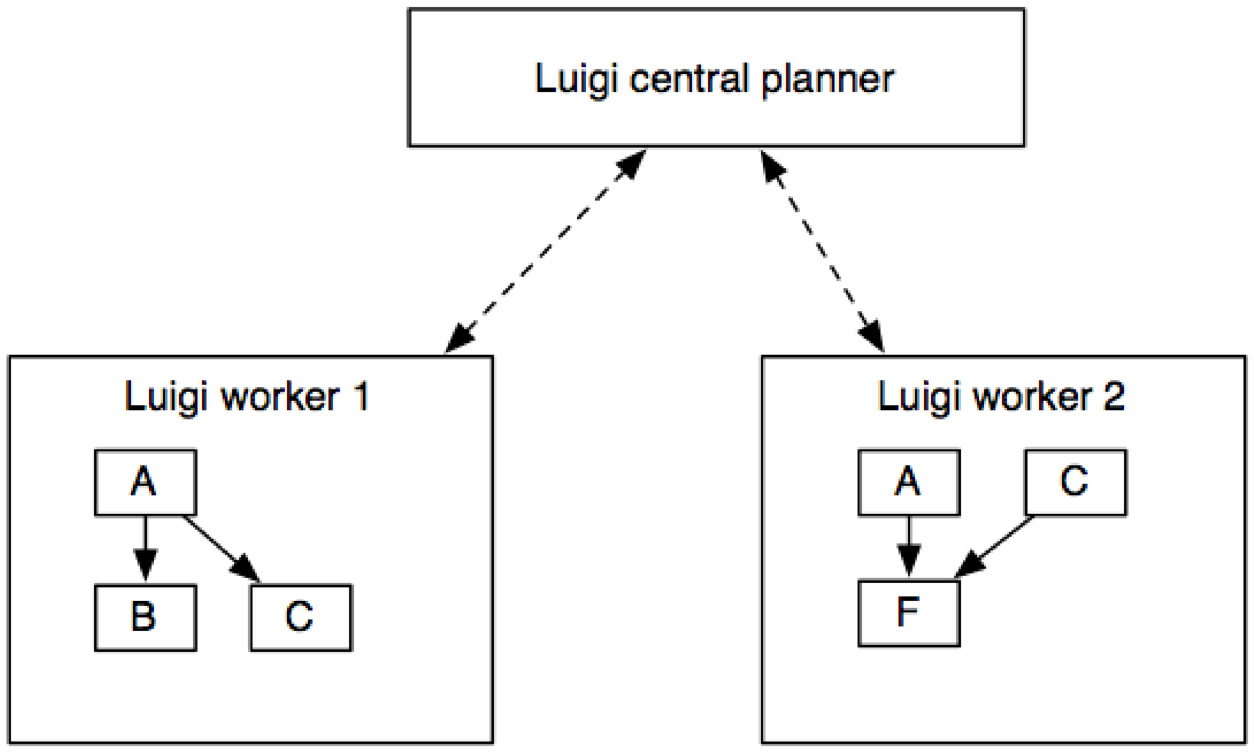
- `/history/by_params/:name?data=params` a listing of all runs of a given task restricted to runs with param values matching the given data. The data is a json blob describing the parameters, e.g. `{"foo": "bar"}` looks for a task with `foo=bar`.

8.7 Execution Model

Luigi has a quite simple model for execution and triggering.

8.7.1 Workers and task execution

The most important aspect is that *no execution is transferred*. When you run a Luigi workflow, the worker schedules all tasks, and also executes the tasks within the process.



The benefit of this scheme is that it's super easy to debug since all execution takes place in the process. It also makes deployment a non-event. During development, you typically run the Luigi workflow from the command line, whereas when you deploy it, you can trigger it using crontab or any other scheduler.

The downside is that Luigi doesn't give you scalability for free. In practice this is not a problem until you start running thousands of tasks.

Isn't the point of Luigi to automate and schedule these workflows? To some extent. Luigi helps you *encode the dependencies* of tasks and build up chains. Furthermore, Luigi's scheduler makes sure that there's a centralized view of the dependency graph and that the same job will not be executed by multiple workers simultaneously.

8.7.2 Scheduler

A client only starts the `run()` method of a task when the single-threaded central scheduler has permitted it. Since the number of tasks is usually very small (in comparison with the petabytes of data one task is processing), we can afford the convenience of a simple centralised server.

The gif is from this presentation, which is about the client and server interaction.

8.7.3 Triggering tasks

Luigi does not include its own triggering, so you have to rely on an external scheduler such as crontab to actually trigger the workflows.

In practice, it's not a big hurdle because Luigi avoids all the mess typically caused by it. Scheduling a complex workflow is fairly trivial using eg. crontab.

In the future, Luigi might implement its own triggering. The dependency on crontab (or any external triggering mechanism) is a bit awkward and it would be nice to avoid.

Trigger example

For instance, if you have an external data dump that arrives every day and that your workflow depends on it, you write a workflow that depends on this data dump. Crontab can then trigger this workflow *every minute* to check if the data has arrived. If it has, it will run the full dependency graph.

```
# my_tasks.py

class DataDump(luigi.ExternalTask):
    date = luigi.DateParameter()
    def output(self): return luigi.contrib.hdfs.HdfsTarget(self.date.strftime('/var/
↪log/dump/%Y-%m-%d.txt'))

class AggregationTask(luigi.Task):
    date = luigi.DateParameter()
    window = luigi.IntParameter()
    def requires(self): return [DataDump(self.date - datetime.timedelta(i)) for i in␣
↪xrange(self.window)]
    def run(self): run_some_cool_stuff(self.input())
    def output(self): return luigi.contrib.hdfs.HdfsTarget('/aggregated-%s-%d' %␣
↪(self.date, self.window))

class RunAll(luigi.Task):
    ''' Dummy task that triggers execution of a other tasks'''
    def requires(self):
        for window in [3, 7, 14]:
            for d in xrange(10): # guarantee that aggregations were run for the past␣
↪10 days
                yield AggregationTask(datetime.date.today() - datetime.timedelta(d),␣
↪window)
```

In your cronline you would then have something like

```
30 0 * * * my-user luigi RunAll --module my_tasks
```

You can trigger this as much as you want from crontab, and even across multiple machines, because the central scheduler will make sure at most one of each `AggregationTask` task is run simultaneously. Note that this might actually mean multiple tasks can be run because there are instances with different parameters, and this can give you some form of parallelization (eg. `AggregationTask(2013-01-09)` might run in parallel with `AggregationTask(2013-01-08)`).

Of course, some Task types (eg. `HadoopJobTask`) can transfer execution to other places, but this is up to each Task to define.

8.8 Luigi Patterns

8.8.1 Code Reuse

One nice thing about Luigi is that it's super easy to depend on tasks defined in other repos. It's also trivial to have "forks" in the execution path, where the output of one task may become the input of many other tasks.

Currently, no semantics for "intermediate" output is supported, meaning that all output will be persisted indefinitely. The upside of that is that if you try to run X -> Y, and Y crashes, you can resume with the previously built X. The downside is that you will have a lot of intermediate results on your file system. A useful pattern is to put these files in a special directory and have some kind of periodical garbage collection clean it up.

8.8.2 Triggering Many Tasks

A convenient pattern is to have a dummy Task at the end of several dependency chains, so you can trigger a multitude of pipelines by specifying just one task in command line, similarly to how e.g. make works.

```
class AllReports(luigi.WrapperTask):
    date = luigi.DateParameter(default=datetime.date.today())
    def requires(self):
        yield SomeReport(self.date)
        yield SomeOtherReport(self.date)
        yield CropReport(self.date)
        yield TPSReport(self.date)
        yield FooBarBazReport(self.date)
```

This simple task will not do anything itself, but will invoke a bunch of other tasks. Per each invocation, Luigi will perform as many of the pending jobs as possible (those which have all their dependencies present).

You'll need to use *`WrapperTask`* for this instead of the usual Task class, because this job will not produce any output of its own, and as such needs a way to indicate when it's complete. This class is used for tasks that only wrap other tasks and that by definition are done if all their requirements exist.

8.8.3 Triggering recurring tasks

A common requirement is to have a daily report (or something else) produced every night. Sometimes for various reasons tasks will keep crashing or lacking their required dependencies for more than a day though, which would lead to a missing deliverable for some date. Oops.

To ensure that the above AllReports task is eventually completed for every day (value of date parameter), one could e.g. add a loop in requires method to yield dependencies on the past few days preceding self.date. Then, so long as Luigi keeps being invoked, the backlog of jobs would catch up nicely after fixing intermittent problems.

Luigi actually comes with a reusable tool for achieving this, called *`RangeDailyBase`* (resp. *`RangeHourlyBase`*). Simply putting

```
luigi --module all_reports RangeDailyBase --of AllReports --start 2015-01-01
```

in your crontab will easily keep gaps from occurring from 2015-01-01 onwards. NB - it will not always loop over everything from 2015-01-01 till current time though, but rather a maximum of 3 months ago by default - see `RangeDailyBase` documentation for this and more knobs for tweaking behavior. See also Monitoring below.

8.8.4 Efficiently triggering recurring tasks

RangeDailyBase, described above, is named like that because a more efficient subclass exists, `RangeDaily` (resp. `RangeHourly`), tailored for hundreds of task classes scheduled concurrently with contiguousness requirements spanning years (which would incur redundant completeness checks and scheduler overload using the naive looping approach.) Usage:

```
luigi --module all_reports RangeDaily --of AllReports --start 2015-01-01
```

It has the same knobs as RangeDailyBase, with some added requirements. Namely the task must implement an efficient bulk_complete method, or must be writing output to file system Target with date parameter value consistently represented in the file path.

8.8.5 Backfilling tasks

Also a common use case, sometimes you have tweaked existing recurring task code and you want to schedule recomputation of it over an interval of dates for that or another reason. Most conveniently it is achieved with the above described range tools, just with both start (inclusive) and stop (exclusive) parameters specified:

```
luigi --module all_reports RangeDaily --of AllReportsV2 --start 2014-10-31 --stop␣
↪2014-12-25
```

8.8.6 Propagating parameters with Range

Some tasks you want to recur may include additional parameters which need to be configured. The Range classes provide a parameter which accepts a `DictParameter` and passes any parameters onwards for this purpose.

```
luigi RangeDaily --of MyTask --start 2014-10-31 --of-params '{"my_string_param": "123
↪", "my_int_param": 123}'
```

Alternatively, you can specify parameters at the task family level (as described *here*), however these will not appear in the task name for the upstream Range task which can have implications in how the scheduler and visualizer handle task instances.

```
luigi RangeDaily --of MyTask --start 2014-10-31 --MyTask-my-param 123
```

8.8.7 Batching multiple parameter values into a single run

Sometimes it'll be faster to run multiple jobs together as a single batch rather than running them each individually. When this is the case, you can mark some parameters with a batch_method in their constructor to tell the worker how to combine multiple values. One common way to do this is by simply running the maximum value. This is good for tasks that overwrite older data when a newer one runs. You accomplish this by setting the batch_method to max, like so:

```
class A(luigi.Task):
    date = luigi.DateParameter(batch_method=max)
```

What's exciting about this is that if you send multiple As to the scheduler, it can combine them and return one. So if `A(date=2016-07-28)`, `A(date=2016-07-29)` and `A(date=2016-07-30)` are all ready to run, you will start running `A(date=2016-07-30)`. While this is running, the scheduler will show `A(date=2016-07-28)`, `A(date=2016-07-29)` as batch running while `A(date=2016-07-30)` is running. When `A(date=2016-07-30)` is done running and becomes FAILED or DONE, the other two tasks will be updated to the same status.

If you want to limit how big a batch can get, simply set max_batch_size. So if you have

```
class A(luigi.Task):
    date = luigi.DateParameter(batch_method=max)

    max_batch_size = 10
```

then the scheduler will batch at most 10 jobs together. You probably do not want to do this with the max batch method, but it can be helpful if you use other methods. You can use any method that takes a list of parameter values and returns a single parameter value.

If you have two max batch parameters, you'll get the max values for both of them. If you have parameters that don't have a batch method, they'll be aggregated separately. So if you have a class like

```
class A(luigi.Task):
    p1 = luigi.IntParameter(batch_method=max)
    p2 = luigi.IntParameter(batch_method=max)
    p3 = luigi.IntParameter()
```

and you create tasks `A(p1=1, p2=2, p3=0)`, `A(p1=2, p2=3, p3=0)`, `A(p1=3, p2=4, p3=1)`, you'll get them batched as `A(p1=2, p2=3, p3=0)` and `A(p1=3, p2=4, p3=1)`.

Note that batched tasks do not take up *[resources]*, only the task that ends up running will use resources. The scheduler only checks that there are sufficient resources for each task individually before batching them all together.

8.8.8 Tasks that regularly overwrite the same data source

If you are overwriting of the same data source with every run, you'll need to ensure that two batches can't run at the same time. You can do this pretty easily by setting batch_method to max and setting a unique resource:

```
class A(luigi.Task):
    date = luigi.DateParameter(batch_method=max)

    resources = {'overwrite_resource': 1}
```

Now if you have multiple tasks such as `A(date=2016-06-01)`, `A(date=2016-06-02)`, `A(date=2016-06-03)`, the scheduler will just tell you to run the highest available one and mark the lower ones as batch_running. Using a unique resource will prevent multiple tasks from writing to the same location at the same time if a new one becomes available while others are running.

8.8.9 Avoiding concurrent writes to a single file

Updating a single file from several tasks is almost always a bad idea, and you need to be very confident that no other good solution exists before doing this. If, however, you have no other option, then you will probably at least need to ensure that no two tasks try to write to the file _simultaneously_.

By turning 'resources' into a Python property, it can return a value dependent on the task parameters or other dynamic attributes:

```
class A(luigi.Task):
    ...

    @property
    def resources(self):
        return { self.important_file_name: 1 }
```

Since, by default, resources have a usage limit of 1, no two instances of Task A will now run if they have the same *important_file_name* property.

8.8.10 Decreasing resources of running tasks

At scheduling time, the luigi scheduler needs to be aware of the maximum resource consumption a task might have once it runs. For some tasks, however, it can be beneficial to decrease the amount of consumed resources between two steps within their run method (e.g. after some heavy computation). In this case, a different task waiting for that particular resource can already be scheduled.

```
class A(luigi.Task):

    # set maximum resources a priori
    resources = {"some_resource": 3}

    def run(self):
        # do something
        ...

        # decrease consumption of "some_resource" by one
        self.decrease_running_resources({"some_resource": 1})

        # continue with reduced resources
        ...
```

8.8.11 Monitoring task pipelines

Luigi comes with some existing ways in `luigi.notifications` to receive notifications whenever tasks crash. Email is the most common way.

The above mentioned range tools for recurring tasks not only implement reliable scheduling for you, but also emit events which you can use to set up delay monitoring. That way you can implement alerts for when jobs are stuck for prolonged periods lacking input data or otherwise requiring attention.

8.8.12 Atomic Writes Problem

A very common mistake done by luigi plumbers is to write data partially to the final destination, that is, not atomically. The problem arises because completion checks in luigi are exactly as naive as running `luigi.target.Target.exists()`. And in many cases it just means to check if a folder exist on disk. During the time we have partially written data, a task depending on that output would think its input is complete. This can have devestating effects, as in the thanksgiving bug.

The concept can be illustrated by imagining that we deal with data stored on local disk and by running commands:

```
# This the BAD way
$ mkdir /outputs/final_output
$ big-slow-calculation > /outputs/final_output/foo.data
```

As stated earlier, the problem is that only partial data exists for a duration, yet we consider the data to be *complete()* because the output folder already exists. Here is a robust version of this:

```
# This is the good way
$ mkdir /outputs/final_output-tmp-123456
$ big-slow-calculation > /outputs/final_output-tmp-123456/foo.data
$ mv --no-target-directory --no-clobber /outputs/final_output{-tmp-123456,}
$ [[ -d /outputs/final_output-tmp-123456 ]] && rm -r /outputs/final_output-tmp-123456
```

Indeed, the good way is not as trivial. It involves coming up with a unique directory name and a pretty complex `mv` line, the reason `mv` need all those is because we don't want `mv` to move a directory into a potentially existing directory. A directory could already exist in exceptional cases, for example when central locking fails and the same task would somehow run twice at the same time. Lastly, in the exceptional case where the file was never moved, one might want to remove the temporary directory that never got used.

Note that this was an example where the storage was on local disk. But for every storage (hard disk file, hdfs file, database table, etc.) this procedure will look different. But do every luigi user need to implement that complexity? Nope, thankfully luigi developers are aware of these and luigi comes with many built-in solutions. In the case of you're dealing with a file system (*FileSystemTarget*), you should consider using *temporary_path()*. For other targets, you should ensure that the way you're writing your final output directory is atomic.

8.8.13 Sending messages to tasks

The central scheduler is able to send messages to particular tasks. When a running task accepts messages, it can access a multiprocessing.Queue object storing incoming messages. You can implement custom behavior to react and respond to messages:

```
class Example(luigi.Task):

    # common task setup
    ...

    # configure the task to accept all incoming messages
    accepts_messages = True

    def run(self):
        # this example runs some loop and listens for the
        # "terminate" message, and responds to all other messages
        for _ in some_loop():
            # check incomming messages
            if not self.scheduler_messages.empty():
                msg = self.scheduler_messages.get()
                if msg.content == "terminate":
                    break
                else:
                    msg.respond("unknown message")

        # finalize
        ...
```

Messages can be sent right from the scheduler UI which also displays responses (if any). Note that this feature is only available when the scheduler is configured to send messages (see the *[scheduler]* config), and the task is configured to accept them.

8.9 Configuration

All configuration can be done by adding configuration files.

Supported config parsers:

- `cfg` (default), based on Python's standard ConfigParser. Values may refer to environment variables using `${ENVVAR}` syntax.
- `toml`

You can choose right parser via `LUIGI_CONFIG_PARSER` environment variable. For example, `LUIGI_CONFIG_PARSER=toml`.

Default (cfg) parser are looked for in:

- `/etc/luigi/client.cfg` (deprecated)
- `/etc/luigi/luigi.cfg`
- `client.cfg` (deprecated)
- `luigi.cfg`
- `LUIGI_CONFIG_PATH` environment variable

TOML parser are looked for in:

- `/etc/luigi/luigi.toml`
- `luigi.toml`
- `LUIGI_CONFIG_PATH` environment variable

Both config lists increase in priority (from low to high). The order only matters in case of key conflicts (see docs for ConfigParser.read). These files are meant for both the client and `luigid`. If you decide to specify your own configuration you should make sure that both the client and `luigid` load it properly.

The config file is broken into sections, each controlling a different part of the config.

Example cfg config:

```
[hadoop]
version=cdh4
streaming_jar=/usr/lib/hadoop-xyz/hadoop-streaming-xyz-123.jar

[core]
scheduler_host=luigi-host.mycompany.foo
```

Example toml config:

```
[hadoop]
version = "cdh4"
streaming_jar = "/usr/lib/hadoop-xyz/hadoop-streaming-xyz-123.jar"

[core]
scheduler_host = "luigi-host.mycompany.foo"
```

Also see examples/config.toml for more complex example.

8.9.1 Parameters from config Ingestion

All parameters can be overridden from configuration files. For instance if you have a Task definition:

```
class DailyReport(luigi.contrib.hadoop.JobTask):
    date = luigi.DateParameter(default=datetime.date.today())
    # ...
```

Then you can override the default value for `DailyReport().date` by providing it in the configuration:

```
[DailyReport]
date=2012-01-01
```

Configuration classes

Using the *Parameters from config Ingestion* method, we derive the conventional way to do global configuration. Imagine this configuration.

```
[mysection]
option=hello
intoption=123
```

We can create a *`Config`* class:

```
import luigi

# Config classes should be camel cased
class mysection(luigi.Config):
    option = luigi.Parameter(default='world')
    intoption = luigi.IntParameter(default=555)

mysection().option
mysection().intoption
```

8.9.2 Configurable options

Luigi comes with a lot of configurable options. Below, we describe each section and the parameters available within it.

8.9.3 [core]

These parameters control core Luigi behavior, such as error e-mails and interactions between the worker and scheduler.

autoload_range New in version 2.8.11.

If false, prevents range tasks from autoloading. They can still be loaded using `--module luigi.tools.range`. Defaults to true. Setting this to true explicitly disables the deprecation warning.

default_scheduler_host Hostname of the machine running the scheduler. Defaults to localhost.

default_scheduler_port Port of the remote scheduler api process. Defaults to 8082.

default_scheduler_url Full path to remote scheduler. Defaults to `http://localhost:8082/`. For TLS support use the URL scheme: `https`, example: `https://luigi.example.com:443/` (Note: you will have to terminate TLS using an HTTP proxy) You can also use this to connect to a local Unix socket using the non-standard URI scheme: `http+unix` example: `http+unix://%2Fvar%2Frun%2Fluigid%2Fluigid.sock/`

hdfs_tmp_dir Base directory in which to store temporary files on hdfs. Defaults to tempfile.gettempdir()

history_filename If set, specifies a filename for Luigi to write stuff (currently just job id) to in mapreduce job's output directory. Useful in a configuration where no history is stored in the output directory by Hadoop.

log_level The default log level to use when no logging_conf_file is set. Must be a valid name of a Python log level. Default is `DEBUG`.

logging_conf_file Location of the logging configuration file.

max_shown_tasks New in version 1.0.20.

The maximum number of tasks returned in a task_list api call. This will restrict the number of tasks shown in task lists in the visualiser. Small values can alleviate frozen browsers when there are too many done tasks. This defaults to 100000 (one hundred thousand).

max_graph_nodes New in version 2.0.0.

The maximum number of nodes returned by a dep_graph or inverse_dep_graph api call. Small values can greatly speed up graph display in the visualiser by limiting the number of nodes shown. Some of the nodes that are not sent to the visualiser will still show up as dependencies of nodes that were sent. These nodes are given TRUNCATED status.

no_configure_logging If true, logging is not configured. Defaults to false.

parallel_scheduling If true, the scheduler will compute complete functions of tasks in parallel using multiprocessing. This can significantly speed up scheduling, but requires that all tasks can be pickled. Defaults to false.

parallel_scheduling_processes The number of processes to use for parallel scheduling. If not specified the default number of processes will be the total number of CPUs available.

rpc_connect_timeout Number of seconds to wait before timing out when making an API call. Defaults to 10.0

rpc_retry_attempts The maximum number of retries to connect the central scheduler before giving up. Defaults to 3

rpc_retry_wait Number of seconds to wait before the next attempt will be started to connect to the central scheduler between two retry attempts. Defaults to 30

8.9.4 [cors]

New in version 2.8.0.

These parameters control `/api/<method> CORS` behaviour (see: W3C Cross-Origin Resource Sharing).

enabled Enables CORS support. Defaults to false.

allowed_origins A list of allowed origins. Used only if `allow_any_origin` is false. Configure in JSON array format, e.g. ["foo", "bar"]. Defaults to empty.

allow_any_origin Accepts requests from any origin. Defaults to false.

allow_null_origin Allows the request to set `null` value of the `Origin` header. Defaults to false.

max_age Content of `Access-Control-Max-Age`. Defaults to 86400 (24 hours).

allowed_methods Content of `Access-Control-Allow-Methods`. Defaults to `GET, OPTIONS`.

allowed_headers Content of `Access-Control-Allow-Headers`. Defaults to `Accept, Content-Type, Origin`.

exposed_headers Content of `Access-Control-Expose-Headers`. Defaults to empty string (will NOT be sent as a response header).

allow_credentials Indicates that the actual request can include user credentials. Defaults to false.

8.9.5 [worker]

These parameters control Luigi worker behavior.

count_uniques If true, workers will only count unique pending jobs when deciding whether to stay alive. So if a worker can't get a job to run and other workers are waiting on all of its pending jobs, the worker will die. `worker_keep_alive` must be `true` for this to have any effect. Defaults to false.

keep_alive If true, workers will stay alive when they run out of jobs to run, as long as they have some pending job waiting to be run. Defaults to false.

ping_interval Number of seconds to wait between pinging scheduler to let it know that the worker is still alive. Defaults to 1.0.

task_limit New in version 1.0.25.

Maximum number of tasks to schedule per invocation. Upon exceeding it, the worker will issue a warning and proceed with the workflow obtained thus far. Prevents incidents due to spamming of the scheduler, usually accidental. Default: no limit.

timeout New in version 1.0.20.

Number of seconds after which to kill a task which has been running for too long. This provides a default value for all tasks, which can be overridden by setting the `worker_timeout` property in any task. Default value is 0, meaning no timeout.

wait_interval Number of seconds for the worker to wait before asking the scheduler for another job after the scheduler has said that it does not have any available jobs.

wait_jitter Size of jitter to add to the worker wait interval such that the multiple workers do not ask the scheduler for another job at the same time. Default: 5.0

max_keep_alive_idle_duration New in version 2.8.4.

Maximum duration to keep worker alive while in idle state. Default: 0 (Indefinitely)

max_reschedules The maximum number of times that a job can be automatically rescheduled by a worker before it will stop trying. Workers will reschedule a job if it is found to not be done when attempting to run a dependent job. This defaults to 1.

retry_external_tasks If true, incomplete external tasks (i.e. tasks where the `run()` method is NotImplemented) will be retested for completion while Luigi is running. This means that if external dependencies are satisfied after a workflow has started, any tasks dependent on that resource will be eligible for running. Note: Every time the task remains incomplete, it will count as FAILED, so normal retry logic applies (see: `retry_count` and `retry_delay`). This setting works best with `worker_keep_alive: true`. If false, external tasks will only be evaluated when Luigi is first invoked. In this case, Luigi will not check whether external dependencies are satisfied while a workflow is in progress, so dependent tasks will remain PENDING until the workflow is reinvoked. Defaults to false for backwards compatibility.

no_install_shutdown_handler By default, workers will stop requesting new work and finish running pending tasks after receiving a `SIGUSR1` signal. This provides a hook for gracefully shutting down workers that are in the process of running (potentially expensive) tasks. If set to true, Luigi will NOT install this shutdown hook on workers. Note this hook does not work on Windows operating systems, or when jobs are launched outside the main execution thread. Defaults to false.

send_failure_email Controls whether the worker will send e-mails on task and scheduling failures. If set to false, workers will only send e-mails on framework errors during scheduling and all other e-mail must be handled by the scheduler. Defaults to true.

check_unfulfilled_deps If true, the worker checks for completeness of dependencies before running a task. In case unfulfilled dependencies are detected, an exception is raised and the task will not run. This mechanism is useful to detect situations where tasks do not create their outputs properly, or when targets were removed after the dependency tree was built. It is recommended to disable this feature only when the completeness checks are known to be bottlenecks, e.g. when the `exists()` calls of the dependencies' outputs are resource-intensive. Defaults to true.

force_multiprocessing By default, luigi uses multiprocessing when *more than one* worker process is requested. When set to true, multiprocessing is used independent of the the number of workers. Defaults to false.

8.9.6 [elasticsearch]

These parameters control use of elasticsearch

marker_index Defaults to "update_log".

marker_doc_type Defaults to "entry".

8.9.7 [email]

General parameters

force_send If true, e-mails are sent in all run configurations (even if stdout is connected to a tty device). Defaults to False.

format Type of e-mail to send. Valid values are "plain", "html" and "none". When set to html, tracebacks are wrapped in <pre> tags to get fixed- width font. When set to none, no e-mails will be sent.

Default value is plain.

method Valid values are "smtp", "sendgrid", "ses" and "sns". SES and SNS are services of Amazon web services. SendGrid is an email delivery service. The default value is "smtp".

In order to send messages through Amazon SNS or SES set up your AWS config files or run Luigi on an EC2 instance with proper instance profile.

In order to use sendgrid, fill in your sendgrid API key in the *[sendgrid]* section.

In order to use smtp, fill in the appropriate fields in the *[smtp]* section.

prefix Optional prefix to add to the subject line of all e-mails. For example, setting this to "[LUIGI]" would change the subject line of an e-mail from "Luigi: Framework error" to "[LUIGI] Luigi: Framework error"

receiver Recipient of all error e-mails. If this is not set, no error e-mails are sent when Luigi crashes unless the crashed job has owners set. If Luigi is run from the command line, no e-mails will be sent unless output is redirected to a file.

Set it to SNS Topic ARN if you want to receive notifications through Amazon SNS. Make sure to set method to sns in this case too.

sender User name in from field of error e-mails. Default value: luigi-client@<server_name>

8.9.8 [batch_notifier]

Parameters controlling the contents of batch notifications sent from the scheduler

email_interval Number of minutes between e-mail sends. Making this larger results in fewer, bigger e-mails. Defaults to 60.

batch_mode Controls how tasks are grouped together in the e-mail. Suppose we have the following sequence of failures:

1. TaskA(a=1, b=1)
2. TaskA(a=1, b=1)
3. TaskA(a=2, b=1)
4. TaskA(a=1, b=2)
5. TaskB(a=1, b=1)

For any setting of batch_mode, the batch e-mail will record 5 failures and mention them in the subject. The difference is in how they will be displayed in the body. Here are example bodies with error_messages set to 0.

"all" only groups together failures for the exact same task:

- TaskA(a=1, b=1) (2 failures)
- TaskA(a=1, b=2) (1 failure)
- TaskA(a=2, b=1) (1 failure)
- TaskB(a=1, b=1) (1 failure)

"family" groups together failures for tasks of the same family:

- TaskA (4 failures)
- TaskB (1 failure)

"unbatched_params" groups together tasks that look the same after removing batched parameters. So if TaskA has a batch_method set for parameter a, we get the following:

- TaskA(b=1) (3 failures)
- TaskA(b=2) (1 failure)
- TaskB(a=1, b=2) (1 failure)

Defaults to "unbatched_params", which is identical to "all" if you are not using batched parameters.

error_lines Number of lines to include from each error message in the batch e-mail. This can be used to keep e-mails shorter while preserving the more useful information usually found near the bottom of stack traces. This can be set to 0 to include all lines. If you don't wish to see error messages, instead set `error_messages` to 0. Defaults to 20.

error_messages Number of messages to preserve for each task group. As most tasks that fail repeatedly do so for similar reasons each time, it's not usually necessary to keep every message. This controls how many messages are kept for each task or task group. The most recent error messages are kept. Set to 0 to not include error messages in the e-mails. Defaults to 1.

group_by_error_messages Quite often, a system or cluster failure will cause many disparate task types to fail for the same reason. This can cause a lot of noise in the batch e-mails. This cuts down on the noise by listing items with identical error messages together. Error messages are compared after limiting by `error_lines`. Defaults to true.

8.9.9 [hadoop]

Parameters controlling basic hadoop tasks

command Name of command for running hadoop from the command line. Defaults to “hadoop”

python_executable Name of command for running python from the command line. Defaults to “python”

scheduler Type of scheduler to use when scheduling hadoop jobs. Can be “fair” or “capacity”. Defaults to “fair”.

streaming_jar Path to your streaming jar. Must be specified to run streaming jobs.

version Version of hadoop used in your cluster. Can be “cdh3”, “chd4”, or “apache1”. Defaults to “cdh4”.

8.9.10 [hdfs]

Parameters controlling the use of snakebite to speed up hdfs queries.

client Client to use for most hadoop commands. Options are “snakebite”, “snakebite_with_hadoopcli_fallback”, “webhdfs” and “hadoopcli”. Snakebite is much faster, so use of it is encouraged. webhdfs is fast and works with Python 3 as well, but has not been used that much in the wild. Both snakebite and webhdfs requires you to install it separately on the machine. Defaults to “hadoopcli”.

client_version Optionally specifies hadoop client version for snakebite.

effective_user Optionally specifies the effective user for snakebite.

namenode_host The hostname of the namenode. Needed for snakebite if snakebite_autoconfig is not set.

namenode_port The port used by snakebite on the namenode. Needed for snakebite if snakebite_autoconfig is not set.

snakebite_autoconfig If true, attempts to automatically detect the host and port of the namenode for snakebite queries. Defaults to false.

tmp_dir Path to where Luigi will put temporary files on hdfs

8.9.11 [hive]

Parameters controlling hive tasks

command Name of the command used to run hive on the command line. Defaults to “hive”.

hiverc_location Optional path to hive rc file.

metastore_host Hostname for metastore.

metastore_port Port for hive to connect to metastore host.

release If set to “apache”, uses a hive client that better handles apache hive output. All other values use the standard client Defaults to “cdh4”.

8.9.12 [kubernetes]

Parameters controlling Kubernetes Job Tasks

auth_method Authorization method to access the cluster. Options are “kubeconfig” or “service-account”

kubeconfig_path Path to kubeconfig file, for cluster authentication. It defaults to `~/.kube/config`, which is the default location when using minikube. When auth_method is “service-account” this property is ignored.

max_retrials Maximum number of retrials in case of job failure.

8.9.13 [mysql]

Parameters controlling use of MySQL targets

marker_table Table in which to store status of table updates. This table will be created if it doesn't already exist. Defaults to "table_updates".

8.9.14 [postgres]

Parameters controlling the use of Postgres targets

local_tmp_dir Directory in which to temporarily store data before writing to postgres. Uses system default if not specified.

marker_table Table in which to store status of table updates. This table will be created if it doesn't already exist. Defaults to "table_updates".

8.9.15 [redshift]

Parameters controlling the use of Redshift targets

marker_table Table in which to store status of table updates. This table will be created if it doesn't already exist. Defaults to "table_updates".

8.9.16 [resources]

This section can contain arbitrary keys. Each of these specifies the amount of a global resource that the scheduler can allow workers to use. The scheduler will prevent running jobs with resources specified from exceeding the counts in this section. Unspecified resources are assumed to have limit 1. Example resources section for a configuration with 2 hive resources and 1 mysql resource:

```
[resources]
hive=2
mysql=1
```

Note that it was not necessary to specify the 1 for mysql here, but it is good practice to do so when you have a fixed set of resources.

8.9.17 [retcode]

Configure return codes for the Luigi binary. In the case of multiple return codes that could apply, for example a failing task and missing data, the *numerically greatest* return code is returned.

We recommend that you copy this set of exit codes to your `luigi.cfg` file:

```
[retcode]
# The following return codes are the recommended exit codes for Luigi
# They are in increasing level of severity (for most applications)
already_running=10
missing_data=20
```

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```
not_run=25
task_failed=30
scheduling_error=35
unhandled_exception=40
```

already_running This can happen in two different cases. Either the local lock file was taken at the time the invocation starts up. Or, the central scheduler have reported that some tasks could not have been run, because other workers are already running the tasks.

missing_data For when an *ExternalTask* is not complete, and this caused the worker to give up. As an alternative to fiddling with this, see the [worker] keep_alive option.

not_run For when a task is not granted run permission by the scheduler. Typically because of lack of resources, because the task has been already run by another worker or because the attempted task is in DISABLED state. Connectivity issues with the central scheduler might also cause this. This does not include the cases for which a run is not allowed due to missing dependencies (missing_data) or due to the fact that another worker is currently running the task (already_running).

task_failed For signaling that there were last known to have failed. Typically because some exception have been raised.

scheduling_error For when a task's `complete()` or `requires()` method fails with an exception, or when the limit number of tasks is reached.

unhandled_exception For internal Luigi errors. Defaults to 4, since this type of error probably will not recover over time.

If you customize return codes, prefer to set them in range 128 to 255 to avoid conflicts. Return codes in range 0 to 127 are reserved for possible future use by Luigi contributors.

8.9.18 [scalding]

Parameters controlling running of scalding jobs

scala_home Home directory for scala on your machine. Defaults to either SCALA_HOME or /usr/share/scala if SCALA_HOME is unset.

scalding_home Home directory for scalding on your machine. Defaults to either SCALDING_HOME or /usr/share/scalding if SCALDING_HOME is unset.

scalding_provided Provided directory for scalding on your machine. Defaults to either SCALDING_HOME/provided or /usr/share/scalding/provided

scalding_libjars Libjars directory for scalding on your machine. Defaults to either SCALDING_HOME/libjars or /usr/share/scalding/libjars

8.9.19 [scheduler]

Parameters controlling scheduler behavior

batch_emails Whether to send batch e-mails for failures and disables rather than sending immediate disable e-mails and just relying on workers to send immediate batch e-mails. Defaults to false.

disable_hard_timeout Hard time limit after which tasks will be disabled by the server if they fail again, in seconds. It will disable the task if it fails **again** after this amount of time. E.g. if this was set to 600 (i.e. 10 minutes), and the task first failed at 10:00am, the task would be disabled if it failed again any time after 10:10am. Note: This setting does not consider the values of the `retry_count` or `disable_window_seconds` settings.

retry_count Number of times a task can fail within `disable_window_seconds` before the scheduler will automatically disable it. If not set, the scheduler will not automatically disable jobs.

disable_persist_seconds Number of seconds for which an automatic scheduler disable lasts. Defaults to 86400 (1 day).

disable_window_seconds Number of seconds during which `retry_count` failures must occur in order for an automatic disable by the scheduler. The scheduler forgets about disables that have occurred longer ago than this amount of time. Defaults to 3600 (1 hour).

record_task_history If true, stores task history in a database. Defaults to false.

remove_delay Number of seconds to wait before removing a task that has no stakeholders. Defaults to 600 (10 minutes).

retry_delay Number of seconds to wait after a task failure to mark it pending again. Defaults to 900 (15 minutes).

state_path Path in which to store the Luigi scheduler's state. When the scheduler is shut down, its state is stored in this path. The scheduler must be shut down cleanly for this to work, usually with a kill command. If the kill command includes the -9 flag, the scheduler will not be able to save its state. When the scheduler is started, it will load the state from this path if it exists. This will restore all scheduled jobs and other state from when the scheduler last shut down.

Sometimes this path must be deleted when restarting the scheduler after upgrading Luigi, as old state files can become incompatible with the new scheduler. When this happens, all workers should be restarted after the scheduler both to become compatible with the updated code and to reschedule the jobs that the scheduler has now forgotten about.

This defaults to /var/lib/luigi-server/state.pickle

worker_disconnect_delay Number of seconds to wait after a worker has stopped pinging the scheduler before removing it and marking all of its running tasks as failed. Defaults to 60.

pause_enabled If false, disables pause/unpause operations and hides the pause toggle from the visualiser.

send_messages When true, the scheduler is allowed to send messages to running tasks and the central scheduler provides a simple prompt per task to send messages. Defaults to true.

metrics_collector Optional setting allowing Luigi to use a contribution to collect metrics about the pipeline to a third-party. By default this uses the default metric collector that acts as a shell and does nothing. The currently available options are “datadog” and “prometheus”.

8.9.20 [sendgrid]

These parameters control sending error e-mails through SendGrid.

apikey API key of the SendGrid account.

8.9.21 [smtp]

These parameters control the smtp server setup.

host Hostname for sending mail through smtp. Defaults to localhost.

local_hostname If specified, overrides the FQDN of localhost in the HELO/EHLO command.

no_tls If true, connects to smtp without TLS. Defaults to false.

password Password to log in to your smtp server. Must be specified for username to have an effect.

port Port number for smtp on smtp_host. Defaults to 0.

ssl If true, connects to smtp through SSL. Defaults to false.

timeout Sets the number of seconds after which smtp attempts should time out. Defaults to 10.

username Username to log in to your smtp server, if necessary.

8.9.22 [spark]

Parameters controlling the default execution of *SparkSubmitTask* and *PySparkTask*:

Deprecated since version 1.1.1: `SparkJob`, `Spark1xJob` and `PySpark1xJob` are deprecated. Please use *SparkSubmitTask* or *PySparkTask*.

spark_submit Command to run in order to submit spark jobs. Default: `"spark-submit"`

master Master url to use for `spark_submit`. Example: local[*], spark://masterhost:7077. Default: Spark default (Prior to 1.1.1: yarn-client)

deploy_mode Whether to launch the driver programs locally ("client") or on one of the worker machines inside the cluster ("cluster"). Default: Spark default

jars Comma-separated list of local jars to include on the driver and executor classpaths. Default: Spark default

packages Comma-separated list of packages to link to on the driver and executors

py_files Comma-separated list of .zip, .egg, or .py files to place on the `PYTHONPATH` for Python apps. Default: Spark default

files Comma-separated list of files to be placed in the working directory of each executor. Default: Spark default

conf: Arbitrary Spark configuration property in the form Prop=Value|Prop2=Value2. Default: Spark default

properties_file Path to a file from which to load extra properties. Default: Spark default

driver_memory Memory for driver (e.g. 1000M, 2G). Default: Spark default

driver_java_options Extra Java options to pass to the driver. Default: Spark default

driver_library_path Extra library path entries to pass to the driver. Default: Spark default

driver_class_path Extra class path entries to pass to the driver. Default: Spark default

executor_memory Memory per executor (e.g. 1000M, 2G). Default: Spark default

Configuration for Spark submit jobs on Spark standalone with cluster deploy mode only:

driver_cores Cores for driver. Default: Spark default

supervise If given, restarts the driver on failure. Default: Spark default

Configuration for Spark submit jobs on Spark standalone and Mesos only:

total_executor_cores Total cores for all executors. Default: Spark default

Configuration for Spark submit jobs on YARN only:

executor_cores Number of cores per executor. Default: Spark default

queue The YARN queue to submit to. Default: Spark default

num_executors Number of executors to launch. Default: Spark default

archives Comma separated list of archives to be extracted into the working directory of each executor. Default: Spark default

hadoop_conf_dir Location of the hadoop conf dir. Sets HADOOP_CONF_DIR environment variable when running spark. Example: /etc/hadoop/conf

Extra configuration for PySparkTask jobs:

py_packages Comma-separated list of local packages (in your python path) to be distributed to the cluster.

Parameters controlling the execution of SparkJob jobs (deprecated):

8.9.23 [task_history]

Parameters controlling storage of task history in a database

db_connection Connection string for connecting to the task history db using sqlalchemy.

8.9.24 [execution_summary]

Parameters controlling execution summary of a worker

summary_length Maximum number of tasks to show in an execution summary. If the value is 0, then all tasks will be displayed. Default value is 5.

8.9.25 [webhdfs]

port The port to use for webhdfs. The normal namenode port is probably on a different port from this one.

user Perform file system operations as the specified user instead of $USER. Since this parameter is not honored by any of the other hdfs clients, you should think twice before setting this parameter.

client_type The type of client to use. Default is the “insecure” client that requires no authentication. The other option is the “kerberos” client that uses kerberos authentication.

8.9.26 [datadog]

api_key The api key found in the account settings of Datadog under the API sections.

app_key The application key found in the account settings of Datadog under the API sections.

default_tags Optional settings that adds the tag to all the metrics and events sent to Datadog. Default value is “application:luigi”.

environment Allows you to tweak multiple environment to differentiate between production, staging or development metrics within Datadog. Default value is “development”.

statsd_host The host that has the statsd instance to allow Datadog to send statsd metric. Default value is “localhost”.

statsd_port The port on the host that allows connection to the statsd host. Defaults value is 8125.

metric_namespace Optional prefix to add to the beginning of every metric sent to Datadog. Default value is “luigi”.

8.9.27 Per Task Retry-Policy

Luigi also supports defining `retry_policy` per task.

```
class GenerateWordsFromHdfs(luigi.Task):

    retry_count = 2
```

(continues on next page)

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```
    ...

class GenerateWordsFromRDBM(luigi.Task):

   retry_count = 5

    ...

class CountLetters(luigi.Task):

    def requires(self):
        return [GenerateWordsFromHdfs()]

    def run():
        yield GenerateWordsFromRDBM()

    ...
```

If none of retry-policy fields is defined per task, the field value will be **default** value which is defined in luigi config file.

To make luigi sticks to the given retry-policy, be sure you run luigi worker with `keep_alive` config. Please check `keep_alive` config in *[worker]* section.

8.9.28 Retry-Policy Fields

The fields below are in retry-policy and they can be defined per task.

- `retry_count`
- `disable_hard_timeout`
- `disable_window_seconds`

8.10 Configure logging

8.10.1 Config options:

Some config options for config [core] section

log_level The default log level to use when no logging_conf_file is set. Must be a valid name of a Python log level. Default is `DEBUG`.

logging_conf_file Location of the logging configuration file.

no_configure_logging If true, logging is not configured. Defaults to false.

8.10.2 Config section

If you're use TOML for configuration file, you can configure logging via `logging` section in this file. See example for more details.

8.10.3 Luigid CLI options:

`--background` Run daemon in background mode. Disable logging setup and set up log level to INFO for root logger.

`--logdir` set logging with INFO level and output in `$logdir/luigi-server.log` file

8.10.4 Worker CLI options:

`--logging-conf-file` Configuration file for logging.

`--log-level` Default log level. Available values: NOTSET, DEBUG, INFO, WARNING, ERROR, CRITICAL. Default DEBUG. See Python documentation For information about levels difference.

8.10.5 Configuration options resolution order:

1. no_configure_logging option
2. `--background`
3. `--logdir`
4. `--logging-conf-file`
5. logging_conf_file option
6. `logging` section
7. `--log-level`
8. log_level option

8.11 Design and limitations

Luigi is the successor to a couple of attempts that we weren't fully happy with. We learned a lot from our mistakes and some design decisions include:

- Straightforward command-line integration.
- As little boilerplate as possible.
- Focus on job scheduling and dependency resolution, not a particular platform. In particular, this means no limitation to Hadoop. Though Hadoop/HDFS support is built-in and is easy to use, this is just one of many types of things you can run.
- A file system abstraction where code doesn't have to care about where files are located.
- Atomic file system operations through this abstraction. If a task crashes it won't lead to a broken state.
- The dependencies are decentralized. No big config file in XML. Each task just specifies which inputs it needs and cross-module dependencies are trivial.
- A web server that renders the dependency graph and does locking, etc for free.
- Trivial to extend with new file systems, file formats, and job types. You can easily write jobs that inserts a Tokyo Cabinet into Cassandra. Adding support for new systems is generally not very hard. (Feel free to send us a patch when you're done!)
- Date algebra included.

- Lots of unit tests of the most basic stuff.

It wouldn't be fair not to mention some limitations with the current design:

- Its focus is on batch processing so it's probably less useful for near real-time pipelines or continuously running processes.
- The assumption is that each task is a sizable chunk of work. While you can probably schedule a few thousand jobs, it's not meant to scale beyond tens of thousands.
- Luigi does not support distribution of execution. When you have workers running thousands of jobs daily, this starts to matter, because the worker nodes get overloaded. There are some ways to mitigate this (trigger from many nodes, use resources), but none of them are ideal.
- Luigi does not come with built-in triggering, and you still need to rely on something like crontab to trigger workflows periodically.

Also, it should be mentioned that Luigi is named after the world's second most famous plumber.

CHAPTER 9

API Reference

luigi	Package containing core luigi functionality.
luigi.contrib	Package containing optional and-on functionality.
luigi.tools	Sort of a standard library for doing stuff with Tasks at a somewhat abstract level.
luigi.local_target	`LocalTarget` provides a concrete implementation of a *Target* class that uses files on the local file system

9.1 luigi package

9.1.1 Subpackages

luigi.configuration package

Submodules

luigi.configuration.base_parser module

class luigi.configuration.base_parser.**BaseParser**

classmethod instance(**args*, ***kwargs*)
Singleton getter

classmethod add_config_path(*path*)

classmethod reload()

luigi.configuration.cfg_parser module

luigi.configuration provides some convenience wrappers around Python's ConfigParser to get configuration options from config files.

The default location for configuration files is luigi.cfg (or client.cfg) in the current working directory, then /etc/luigi/client.cfg.

Configuration has largely been superseded by parameters since they can do essentially everything configuration can do, plus a tighter integration with the rest of Luigi.

See *Configuration* for more info.

exception `luigi.configuration.cfg_parser.`**`InterpolationMissingEnvvarError`**(*option*, *section*, *value*, *envvar*)

Bases: `ConfigParser.InterpolationError`

Raised when option value refers to a nonexisting environment variable.

class `luigi.configuration.cfg_parser.`**`EnvironmentInterpolation`**

Bases: `object`

Custom interpolation which allows values to refer to environment variables using the `${ENVVAR}` syntax.

`before_get`(*parser*, *section*, *option*, *value*, *defaults*)

class `luigi.configuration.cfg_parser.`**`CombinedInterpolation`**(*interpolations*)

Bases: `object`

Custom interpolation which applies multiple interpolations in series.

Parameters **`interpolations`** – a sequence of configparser.Interpolation objects.

`before_get`(*parser*, *section*, *option*, *value*, *defaults*)

`before_read`(*parser*, *section*, *option*, *value*)

`before_set`(*parser*, *section*, *option*, *value*)

`before_write`(*parser*, *section*, *option*, *value*)

class `luigi.configuration.cfg_parser.`**`LuigiConfigParser`**(*defaults=None*, *dict_type=<class 'collections.OrderedDict'>*, *allow_no_value=False*)

Bases: *`luigi.configuration.base_parser.BaseParser`*, `ConfigParser.ConfigParser`

`NO_DEFAULT = <object object>`

`enabled = True`

`classmethod reload`()

`has_option`(*section*, *option*)

modified has_option Check for the existence of a given option in a given section. If the specified 'section' is None or an empty string, DEFAULT is assumed. If the specified 'section' does not exist, returns False.

`get`(*section*, *option*, *default=<object object>*, ***kwargs*)

`getboolean`(*section*, *option*, *default=<object object>*)

`getint`(*section*, *option*, *default=<object object>*)

getfloat (*section*, *option*, *default=<object object>*)

getintdict (*section*)

set (*section*, *option*, *value=None*)

luigi.configuration.core module

luigi.configuration.core.**get_config** (*parser='cfg'*)
Get configs singleton for parser

luigi.configuration.core.**add_config_path** (*path*)
Select config parser by file extension and add path into parser.

luigi.configuration.toml_parser module

class luigi.configuration.toml_parser.**LuigiTomlParser**
Bases: *luigi.configuration.base_parser.BaseParser*

NO_DEFAULT = <object object>

enabled = False

data = {}

read (*config_paths*)

get (*section*, *option*, *default=<object object>*, ***kwargs*)

getboolean (*section*, *option*, *default=<object object>*)

getint (*section*, *option*, *default=<object object>*)

getfloat (*section*, *option*, *default=<object object>*)

getintdict (*section*)

set (*section*, *option*, *value=None*)

has_option (*section*, *option*)

Module contents

luigi.configuration.**add_config_path** (*path*)
Select config parser by file extension and add path into parser.

luigi.configuration.**get_config** (*parser='cfg'*)
Get configs singleton for parser

class luigi.configuration.**LuigiConfigParser** (*defaults=None*, *dict_type=<class 'collections.OrderedDict'>*, *allow_no_value=False*)
Bases: *luigi.configuration.base_parser.BaseParser*, ConfigParser.ConfigParser

NO_DEFAULT = <object object>

enabled = True

classmethod reload ()

has_option(*section*, *option*)
modified has_option Check for the existence of a given option in a given section. If the specified 'section' is None or an empty string, DEFAULT is assumed. If the specified 'section' does not exist, returns False.

get(*section*, *option*, *default=<object object>*, ***kwargs*)

getboolean(*section*, *option*, *default=<object object>*)

getint(*section*, *option*, *default=<object object>*)

getfloat(*section*, *option*, *default=<object object>*)

getintdict(*section*)

set(*section*, *option*, *value=None*)

class luigi.configuration.**LuigiTomlParser**
Bases: `luigi.configuration.base_parser.BaseParser`

NO_DEFAULT = <object object>

enabled = False

data = {}

read(*config_paths*)

get(*section*, *option*, *default=<object object>*, ***kwargs*)

getboolean(*section*, *option*, *default=<object object>*)

getint(*section*, *option*, *default=<object object>*)

getfloat(*section*, *option*, *default=<object object>*)

getintdict(*section*)

set(*section*, *option*, *value=None*)

has_option(*section*, *option*)

luigi.contrib package

Subpackages

luigi.contrib.hdfs package

Submodules

luigi.contrib.hdfs.abstract_client module

Module containing abstract class about hdfs clients.

class luigi.contrib.hdfs.abstract_client.**HdfsFileSystem**
Bases: `luigi.target.FileSystem`

This client uses Apache 2.x syntax for file system commands, which also matched CDH4.

rename(*path*, *dest*)
Rename or move a file.

In hdfs land, "mv" is often called rename. So we add an alias for `move()` called `rename()`. This is also to keep backward compatibility since `move()` became standardized in luigi's filesystem interface.

rename_dont_move (*path*, *dest*)
Override this method with an implementation that uses rename2, which is a rename operation that never moves.

rename2 - https://github.com/apache/hadoop/blob/ae91b13/hadoop-hdfs-project/hadoop-hdfs/src/main/java/org/apache/hadoop/hdfs/protocol/ClientProtocol.java (lines 483-523)

remove (*path*, *recursive=True*, *skip_trash=False*)
Remove file or directory at location `path`

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

chmod (*path*, *permissions*, *recursive=False*)

chown (*path*, *owner*, *group*, *recursive=False*)

count (*path*)
Count contents in a directory

copy (*path*, *destination*)
Copy a file or a directory with contents. Currently, LocalFileSystem and MockFileSystem support only single file copying but S3Client copies either a file or a directory as required.

put (*local_path*, *destination*)

get (*path*, *local_destination*)

mkdir (*path*, *parents=True*, *raise_if_exists=False*)
Create directory at location `path`

Creates the directory at `path` and implicitly create parent directories if they do not already exist.

Parameters

- **path** (*str*) – a path within the FileSystem to create as a directory.
- **parents** (*bool*) – Create parent directories when necessary. When parents=False and the parent directory doesn't exist, raise luigi.target.MissingParentDirectory
- **raise_if_exists** (*bool*) – raise luigi.target.FileAlreadyExists if the folder already exists.

listdir (*path*, *ignore_directories=False*, *ignore_files=False*, *include_size=False*, *include_type=False*, *include_time=False*, *recursive=False*)
Return a list of files rooted in path.

This returns an iterable of the files rooted at `path`. This is intended to be a recursive listing.

Parameters **path** (*str*) – a path within the FileSystem to list.

Note: This method is optional, not all FileSystem subclasses implements it.

touchz (*path*)

luigi.contrib.hdfs.clients module

The implementations of the hdfs clients. The hadoop cli client and the snakebite client.

luigi.contrib.hdfs.clients.**get_autoconfig_client**(*client_cache=<thread._local object>*)

Creates the client as specified in the *luigi.cfg* configuration.

luigi.contrib.hdfs.clients.**exists**(**args*, ***kwargs*)

luigi.contrib.hdfs.clients.**rename**(**args*, ***kwargs*)

luigi.contrib.hdfs.clients.**remove**(**args*, ***kwargs*)

luigi.contrib.hdfs.clients.**mkdir**(**args*, ***kwargs*)

luigi.contrib.hdfs.clients.**listdir**(**args*, ***kwargs*)

luigi.contrib.hdfs.config module

You can configure what client by setting the "client" config under the "hdfs" section in the configuration, or using the `--hdfs-client` command line option. "hadoopcli" is the slowest, but should work out of the box. "snakebite" is the fastest, but requires Snakebite to be installed.

class luigi.contrib.hdfs.config.**hdfs**(**args*, ***kwargs*)

Bases: *luigi.task.Config*

client_version = IntParameter (defaults to None)

effective_user = OptionalParameter (defaults to None): Optionally specifies the effec

snakebite_autoconfig = BoolParameter (defaults to False)

namenode_host = OptionalParameter (defaults to None)

namenode_port = IntParameter (defaults to None)

client = Parameter (defaults to hadoopcli)

tmp_dir = OptionalParameter (defaults to None)

class luigi.contrib.hdfs.config.**hadoopcli**(**args*, ***kwargs*)

Bases: *luigi.task.Config*

command = Parameter (defaults to hadoop): The hadoop command, will run split() on it,

version = Parameter (defaults to cdh4): Can also be cdh3 or apache1

luigi.contrib.hdfs.config.**load_hadoop_cmd**()

luigi.contrib.hdfs.config.**get_configured_hadoop_version**()

CDH4 (hadoop 2+) has a slightly different syntax for interacting with hdfs via the command line.

The default version is CDH4, but one can override this setting with "cdh3" or "apache1" in the hadoop section of the config in order to use the old syntax.

luigi.contrib.hdfs.config.**get_configured_hdfs_client**()

This is a helper that fetches the configuration value for 'client' in the [hdfs] section. It will return the client that retains backwards compatibility when 'client' isn't configured.

luigi.contrib.hdfs.config.**tmppath**(*path=None*, *include_unix_username=True*)

@param path: target path for which it is needed to generate temporary location @type path: str @type include_unix_username: bool @rtype: str

Note that include_unix_username might work on windows too.

luigi.contrib.hdfs.error module

The implementations of the hdfs clients. The hadoop cli client and the snakebite client.

exception luigi.contrib.hdfs.error.**HDFSCliError**(*command*, *returncode*, *stdout*, *stderr*)
Bases: exceptions.Exception

luigi.contrib.hdfs.format module

exception luigi.contrib.hdfs.format.**HdfsAtomicWriteError**
Bases: exceptions.IOError

class luigi.contrib.hdfs.format.**HdfsReadPipe**(*path*)
Bases: *luigi.format.InputPipeProcessWrapper*

class luigi.contrib.hdfs.format.**HdfsAtomicWritePipe**(*path*)
Bases: *luigi.format.OutputPipeProcessWrapper*

File like object for writing to HDFS

The referenced file is first written to a temporary location and then renamed to final location on close(). If close() isn’t called the temporary file will be cleaned up when this object is garbage collected

TODO: if this is buggy, change it so it first writes to a local temporary file and then uploads it on completion

abort()

close()

class luigi.contrib.hdfs.format.**HdfsAtomicWriteDirPipe**(*path*, *data_extension=”*)
Bases: *luigi.format.OutputPipeProcessWrapper*

Writes a data<data_extension> file to a directory at <path>.

abort()

close()

class luigi.contrib.hdfs.format.**PlainFormat**
Bases: *luigi.format.Format*

input = 'bytes'

output = 'hdfs'

hdfs_writer(*path*)

hdfs_reader(*path*)

pipe_reader(*path*)

pipe_writer(*output_pipe*)

class luigi.contrib.hdfs.format.**PlainDirFormat**
Bases: *luigi.format.Format*

input = 'bytes'

output = 'hdfs'

hdfs_writer(*path*)

hdfs_reader(*path*)

pipe_reader(*path*)

pipe_writer(*path*)

class luigi.contrib.hdfs.format.**CompatibleHdfsFormat**(*writer*, *reader*, *input=None*)
Bases: *luigi.format.Format*

output = 'hdfs'

pipe_writer(*output*)

pipe_reader(*input*)

hdfs_writer(*output*)

hdfs_reader(*input*)

luigi.contrib.hdfs.hadoopcli_clients module

The implementations of the hdfs clients. The hadoop cli client and the snakebite client.

luigi.contrib.hdfs.hadoopcli_clients.**create_hadoopcli_client**()
Given that we want one of the hadoop cli clients (unlike snakebite), this one will return the right one.

class luigi.contrib.hdfs.hadoopcli_clients.**HdfsClient**
Bases: *luigi.contrib.hdfs.abstract_client.HdfsFileSystem*

This client uses Apache 2.x syntax for file system commands, which also matched CDH4.

recursive_listdir_cmd = ['-ls', '-R']

static call_check(*command*)

exists(*path*)
Use `hadoop fs -stat` to check file existence.

move(*path*, *dest*)
Move a file, as one would expect.

remove(*path*, *recursive=True*, *skip_trash=False*)
Remove file or directory at location `path`

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

chmod(*path*, *permissions*, *recursive=False*)

chown(*path*, *owner*, *group*, *recursive=False*)

count(*path*)
Count contents in a directory

copy(*path*, *destination*)
Copy a file or a directory with contents. Currently, LocalFileSystem and MockFileSystem support only single file copying but S3Client copies either a file or a directory as required.

put(*local_path*, *destination*)

get(*path*, *local_destination*)

getmerge(*path*, *local_destination*, *new_line=False*)

mkdir (*path*, *parents=True*, *raise_if_exists=False*)
Create directory at location `path`

Creates the directory at `path` and implicitly create parent directories if they do not already exist.

Parameters

- **path** (*str*) – a path within the FileSystem to create as a directory.
- **parents** (*bool*) – Create parent directories when necessary. When parents=False and the parent directory doesn't exist, raise luigi.target.MissingParentDirectory
- **raise_if_exists** (*bool*) – raise luigi.target.FileAlreadyExists if the folder already exists.

listdir (*path*, *ignore_directories=False*, *ignore_files=False*, *include_size=False*, *include_type=False*, *include_time=False*, *recursive=False*)
Return a list of files rooted in path.

This returns an iterable of the files rooted at `path`. This is intended to be a recursive listing.

Parameters path (*str*) – a path within the FileSystem to list.

Note: This method is optional, not all FileSystem subclasses implements it.

touchz (*path*)

class luigi.contrib.hdfs.hadoopcli_clients.**HdfsClientCdh3**
Bases: *luigi.contrib.hdfs.hadoopcli_clients.HdfsClient*

This client uses CDH3 syntax for file system commands.

mkdir (*path*, *parents=True*, *raise_if_exists=False*)
No explicit -p switch, this version of Hadoop always creates parent directories.

remove (*path*, *recursive=True*, *skip_trash=False*)
Remove file or directory at location `path`

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

class luigi.contrib.hdfs.hadoopcli_clients.**HdfsClientApache1**
Bases: *luigi.contrib.hdfs.hadoopcli_clients.HdfsClientCdh3*

This client uses Apache 1.x syntax for file system commands, which are similar to CDH3 except for the file existence check.

recursive_listdir_cmd = ['-lsr']

exists (*path*)
Use `hadoop fs -stat` to check file existence.

luigi.contrib.hdfs.snakebite_client module

A luigi file system client that wraps around snakebite

Originally written by Alan Brenner <alan@magnetic.com> github.com/alanbbr

class luigi.contrib.hdfs.snakebite_client.**SnakebiteHdfsClient**
Bases: *luigi.contrib.hdfs.abstract_client.HdfsFileSystem*

A hdfs client using snakebite. Since Snakebite has a python API, it'll be about 100 times faster than the hadoop cli client, which does shell out to a java program on each file system operation.

static list_path(*path*)

get_bite()
If Luigi has forked, we have a different PID, and need to reconnect.

exists(*path*)
Use snakebite.test to check file existence.

Parameters **path** (*string*) – path to test

Returns boolean, True if path exists in HDFS

move(*path*, *dest*)
Use snakebite.rename, if available.

Parameters

- **path** (*either a string or sequence of strings*) – source file(s)
- **dest** (*string*) – destination file (single input) or directory (multiple)

Returns list of renamed items

rename_dont_move(*path*, *dest*)
Use snakebite.rename_dont_move, if available.

Parameters

- **path** (*string*) – source path (single input)
- **dest** (*string*) – destination path

Returns True if succeeded

Raises snakebite.errors.FileAlreadyExistsException

remove(*path*, *recursive=True*, *skip_trash=False*)
Use snakebite.delete, if available.

Parameters

- **path** (*either a string or a sequence of strings*) – delete-able file(s) or directory(ies)
- **recursive** (*boolean, default is True*) – delete directories trees like *nix: rm -r
- **skip_trash** (*boolean, default is False (use trash)*) – do or don't move deleted items into the trash first

Returns list of deleted items

chmod(*path*, *permissions*, *recursive=False*)
Use snakebite.chmod, if available.

Parameters

- **path** (*either a string or sequence of strings*) – update-able file(s)
- **permissions** (*octal*) – *nix style permission number
- **recursive** (*boolean, default is False*) – change just listed entry(ies) or all in directories

Returns list of all changed items

chown (*path*, *owner*, *group*, *recursive=False*)
Use snakebite.chown/chgrp, if available.

One of owner or group must be set. Just setting group calls chgrp.

Parameters

- **path** (*either a string or sequence of strings*) – update-able file(s)
- **owner** (*string*) – new owner, can be blank
- **group** (*string*) – new group, can be blank
- **recursive** (*boolean, default is False*) – change just listed entry(ies) or all in directories

Returns list of all changed items

count (*path*)
Use snakebite.count, if available.

Parameters **path** (*string*) – directory to count the contents of

Returns dictionary with content_size, dir_count and file_count keys

copy (*path*, *destination*)
Raise a NotImplementedError exception.

put (*local_path*, *destination*)
Raise a NotImplementedError exception.

get (*path*, *local_destination*)
Use snakebite.copyToLocal, if available.

Parameters

- **path** (*string*) – HDFS file
- **local_destination** (*string*) – path on the system running Luigi

get_merge (*path*, *local_destination*)
Using snakebite getmerge to implement this. :param path: HDFS directory :param local_destination: path on the system running Luigi :return: merge of the directory

mkdir (*path*, *parents=True*, *mode=493*, *raise_if_exists=False*)
Use snakebite.mkdir, if available.

Snakebite's mkdir method allows control over full path creation, so by default, tell it to build a full path to work like `hadoop fs -mkdir`.

Parameters

- **path** (*string*) – HDFS path to create
- **parents** (*boolean, default is True*) – create any missing parent directories
- **mode** (*octal, default 0755*) – *nix style owner/group/other permissions

listdir (*path*, *ignore_directories=False*, *ignore_files=False*, *include_size=False*, *include_type=False*, *include_time=False*, *recursive=False*)
Use snakebite.ls to get the list of items in a directory.

Parameters

- **path** (*string*) – the directory to list
- **ignore_directories** (*boolean, default is False*) – if True, do not yield directory entries

- **ignore_files** (*boolean, default is False*) – if True, do not yield file entries
- **include_size** (*boolean, default is False (do not include)*) – include the size in bytes of the current item
- **include_type** (*boolean, default is False (do not include)*) – include the type (d or f) of the current item
- **include_time** (*boolean, default is False (do not include)*) – include the last modification time of the current item
- **recursive** (*boolean, default is False (do not recurse)*) – list subdirectory contents

Returns yield with a string, or if any of the include_* settings are true, a tuple starting with the path, and include_* items in order

touchz (*path*)
Raise a NotImplementedError exception.

luigi.contrib.hdfs.target module

Provides access to HDFS using the *HdfsTarget*, a subclass of *Target*.

class luigi.contrib.hdfs.target.**HdfsTarget** (*path=None*, *format=None*, *is_tmp=False*, *fs=None*)
Bases: *luigi.target.FileSystemTarget*

fs

glob_exists (*expected_files*)

open (*mode='r'*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters **mode** (*str*) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

remove (*skip_trash=False*)
Remove the resource at the path specified by this FileSystemTarget.

This method is implemented by using *fs*.

rename (*path*, *raise_if_exists=False*)
Does not change self.path.

Unlike `move_dir()`, `rename()` might cause nested directories. See spotify/luigi#522

move (*path*, *raise_if_exists=False*)
Alias for `rename()`

move_dir (*path*)
Move using *rename_dont_move*

New since after luigi v2.1: Does not change self.path

One could argue that the implementation should use the mkdir+raise_if_exists approach, but we at Spotify have had more trouble with that over just using plain mv. See spotify/luigi#557

copy (*dst_dir*)
Copy to destination directory.

is_writable ()
Currently only works with hadoopcli

class luigi.contrib.hdfs.target.**HdfsFlagTarget** (*path*, *format=None*, *client=None*, *flag='_SUCCESS'*)
Bases: *luigi.contrib.hdfs.target.HdfsTarget*

Defines a target directory with a flag-file (defaults to *_SUCCESS*) used to signify job success.

This checks for two things:

- the path exists (just like the HdfsTarget)
- the _SUCCESS file exists within the directory.

Because Hadoop outputs into a directory and not a single file, the path is assumed to be a directory.

Initializes a HdfsFlagTarget.

Parameters

- **path** (*str*) – the directory where the files are stored.
- **client** –
- **flag** (*str*) –

exists ()
Returns `True` if the path for this FileSystemTarget exists; `False` otherwise.

This method is implemented by using `fs`.

luigi.contrib.hdfs.webhdfs_client module

A luigi file system client that wraps around the hdfs-library (a webhdfs client)

This is a sensible fast alternative to snakebite. In particular for python3 users, where snakebite is not supported at the time of writing (dec 2015).

Note. This wrapper client is not feature complete yet. As with most software the authors only implement the features they need. If you need to wrap more of the file system operations, please do and contribute back.

class luigi.contrib.hdfs.webhdfs_client.**webhdfs** (**args*, ***kwargs*)
Bases: *luigi.task.Config*

port = IntParameter (defaults to 50070): Port for webhdfs

user = Parameter (defaults to): Defaults to $USER envvar

client_type = ChoiceParameter (defaults to insecure): Type of hdfs client to use. Cho

class luigi.contrib.hdfs.webhdfs_client.**WebHdfsClient** (*host=None*, *port=None*, *user=None*, *client_type=None*)
Bases: *luigi.contrib.hdfs.abstract_client.HdfsFileSystem*

A webhdfs that tries to confirm to luigis interface for file existence.

The library is using this api.

url

client

walk (*path*, *depth=1*)

exists (*path*)
Returns true if the path exists and false otherwise.

upload (*hdfs_path*, *local_path*, *overwrite=False*)

download (*hdfs_path*, *local_path*, *overwrite=False*, *n_threads=-1*)

remove (*hdfs_path*, *recursive=True*, *skip_trash=False*)
Remove file or directory at location `path`

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

read (*hdfs_path*, *offset=0*, *length=None*, *buffer_size=None*, *chunk_size=1024*, *buffer_char=None*)

move (*path*, *dest*)
Move a file, as one would expect.

mkdir (*path*, *parents=True*, *mode=493*, *raise_if_exists=False*)
Has no returnvalue (just like WebHDFS)

chmod (*path*, *permissions*, *recursive=False*)
Raise a NotImplementedError exception.

chown (*path*, *owner*, *group*, *recursive=False*)
Raise a NotImplementedError exception.

count (*path*)
Raise a NotImplementedError exception.

copy (*path*, *destination*)
Raise a NotImplementedError exception.

put (*local_path*, *destination*)
Restricted version of upload

get (*path*, *local_destination*)
Restricted version of download

listdir (*path*, *ignore_directories=False*, *ignore_files=False*, *include_size=False*, *include_type=False*, *include_time=False*, *recursive=False*)
Return a list of files rooted in path.

This returns an iterable of the files rooted at `path`. This is intended to be a recursive listing.

Parameters **path** (*str*) – a path within the FileSystem to list.

Note: This method is optional, not all FileSystem subclasses implements it.

touchz (*path*)
To touchz using the web hdfs "write" cmd.

Module contents

Provides access to HDFS using the `HdfsTarget`, a subclass of *`Target`*. You can configure what client by setting the "client" config under the "hdfs" section in the configuration, or using the `--hdfs-client` command line option. "hadoopcli" is the slowest, but should work out of the box. "snakebite" is the fastest, but requires Snakebite to be installed.

Since the hdfs functionality is quite big in luigi, it's split into smaller files under `luigi/contrib/hdfs/*.py`. But for the sake of convenience and API stability, everything is reexported under *`luigi.contrib.hdfs`*.

Submodules

luigi.contrib.azureblob module

luigi.contrib.batch module

AWS Batch wrapper for Luigi

From the AWS website:

> AWS Batch enables you to run batch computing workloads on the AWS Cloud.
>
> Batch computing is a common way for developers, scientists, and engineers to access large amounts of compute resources, and AWS Batch removes the undifferentiated heavy lifting of configuring and managing the required infrastructure. AWS Batch is similar to traditional batch computing software. This service can efficiently provision resources in response to jobs submitted in order to eliminate capacity constraints, reduce compute costs, and deliver results quickly.

See AWS Batch User Guide for more details.

To use AWS Batch, you create a jobDefinition JSON that defines a docker run command, and then submit this JSON to the API to queue up the task. Behind the scenes, AWS Batch auto-scales a fleet of EC2 Container Service instances, monitors the load on these instances, and schedules the jobs.

This boto3-powered wrapper allows you to create Luigi Tasks to submit Batch `jobDefinition``s. You can either pass a dict (mapping directly to the ``jobDefinition` JSON) OR an Amazon Resource Name (arn) for a previously registered `jobDefinition`.

Requires:

- boto3 package
- Amazon AWS credentials discoverable by boto3 (e.g., by using `aws configure` from awscli)
- An enabled AWS Batch job queue configured to run on a compute environment.

Written and maintained by Jake Feala (@jfeala) for Outlier Bio (@outlierbio)

exception `luigi.contrib.batch.`**`BatchJobException`**

Bases: `exceptions.Exception`

class `luigi.contrib.batch.`**`BatchClient`**(*poll_time=10*)

Bases: `object`

`get_active_queue`()

Get name of first active job queue

`get_job_id_from_name`(*job_name*)

Retrieve the first job ID matching the given name

`get_job_status`(*job_id*)

Retrieve task statuses from ECS API

Parameters **(str)** (*job_id*) – AWS Batch job uuid

Returns one of {SUBMITTED|PENDING|RUNNABLE|STARTING|RUNNING|SUCCEEDED|FAILED}

`get_logs`(*log_stream_name, get_last=50*)

Retrieve log stream from CloudWatch

submit_job (*job_definition*, *parameters*, *job_name=None*, *queue=None*)
Wrap submit_job with useful defaults

wait_on_job (*job_id*)
Poll task status until STOPPED

register_job_definition (*json_fpath*)
Register a job definition with AWS Batch, using a JSON

class `luigi.contrib.batch.`**BatchTask** (**args*, ***kwargs*)
Bases: `luigi.task.Task`

Base class for an Amazon Batch job

Amazon Batch requires you to register "job definitions", which are JSON descriptions for how to issue the `docker run` command. This Luigi Task requires a pre-registered Batch jobDefinition name passed as a Parameter

Parameters

- **(str)** (*job_definition*) – name of pre-registered jobDefinition
- **job_name** – name of specific job, for tracking in the queue and logs.
- **job_queue** – name of job queue where job is going to be submitted.

job_definition = Parameter

job_name = OptionalParameter (defaults to None)

job_queue = OptionalParameter (defaults to None)

poll_time = IntParameter (defaults to 10)

run ()
The task run method, to be overridden in a subclass.

See *Task.run*

parameters
Override to return a dict of parameters for the Batch Task

luigi.contrib.beam_dataflow module

class `luigi.contrib.beam_dataflow.`**DataflowParamKeys**
Bases: `object`

Defines the naming conventions for Dataflow execution params. For example, the Java API expects param names in lower camel case, whereas the Python implementation expects snake case.

runner

project

zone

region

staging_location

temp_location

gcp_temp_location

num_workers

autoscaling_algorithm

max_num_workers

disk_size_gb

worker_machine_type

worker_disk_type

job_name

service_account

network

subnetwork

labels

class luigi.contrib.beam_dataflow.**BeamDataflowJobTask**

Bases: *luigi.task.MixinNaiveBulkComplete*, *luigi.task.Task*

Luigi wrapper for a Dataflow job. Must be overridden for each Beam SDK with that SDK's dataflow_executable().

For more documentation, see: https://cloud.google.com/dataflow/docs/guides/specifying-exec-params

The following required Dataflow properties must be set:

project # GCP project ID temp_location # Cloud storage path for temporary files

The following optional Dataflow properties can be set:

runner # PipelineRunner implementation for your Beam job. Default: DirectRunner

num_workers # The number of workers to start the task with Default: Determined by Dataflow service

autoscaling_algorithm # The Autoscaling mode for the Dataflow job Default: *THROUGHPUT_BASED*

max_num_workers # Used if the autoscaling is enabled Default: Determined by Dataflow service

network # Network in GCE to be used for launching workers Default: a network named "default"

subnetwork # Subnetwork in GCE to be used for launching workers Default: Determined by Dataflow service

disk_size_gb # Remote worker disk size. Minimum value is 30GB Default: set to 0 to use GCP project default

worker_machine_type # Machine type to create Dataflow worker VMs Default: Determined by Dataflow service

job_name # Custom job name, must be unique across project's active jobs

worker_disk_type # Specify SSD for local disk or defaults to hard disk as a full URL of disk type resource Default: Determined by Dataflow service.

service_account # Service account of Dataflow VMs/workers Default: active GCE service account

region # Region to deploy Dataflow job to Default: us-central1

zone # Availability zone for launching workers instances Default: an available zone in the specified region

staging_location # Cloud Storage bucket for Dataflow to stage binary files Default: the value of temp_location

gcp_temp_location # Cloud Storage path for Dataflow to stage temporary files Default: the value of temp_location

labels # Custom GCP labels attached to the Dataflow job Default: nothing

project = None

runner = None

temp_location = None

staging_location = None

gcp_temp_location = None

num_workers = None

autoscaling_algorithm = None

max_num_workers = None

network = None

subnetwork = None

disk_size_gb = None

worker_machine_type = None

job_name = None

worker_disk_type = None

service_account = None

zone = None

region = None

labels = {}

cmd_line_runner
alias of `_CmdLineRunner`

dataflow_params = None

dataflow_executable()
Command representing the Dataflow executable to be run. For example:

return [‘java’, ‘com.spotify.luigi.MyClass’, ‘-Xmx256m’]

args()
Extra String arguments that will be passed to your Dataflow job. For example:

return [‘–setup_file=setup.py’]

before_run()
Hook that gets called right before the Dataflow job is launched. Can be used to setup any temporary files/tables, validate input, etc.

on_successful_run()
Callback that gets called right after the Dataflow job has finished successfully but before validate_output is run.

validate_output()
Callback that can be used to validate your output before it is moved to its final location. Returning false here will cause the job to fail, and output to be removed instead of published.

file_pattern()
If one/some of the input target files are not in the pattern of part-, *we can add the key of the required target*

and the correct file pattern that should be appended in the command line here. If the input target key is not found in this dict, the file pattern will be assumed to be part- for that target.

:return A dictionary of overridden file pattern that is not part-* for the inputs

on_successful_output_validation()
Callback that gets called after the Dataflow job has finished successfully if validate_output returns True.

cleanup_on_error(*error*)
Callback that gets called after the Dataflow job has finished unsuccessfully, or validate_output returns False.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

static **get_target_path**(*target*)
Given a luigi Target, determine a stringly typed path to pass as a Dataflow job argument.

luigi.contrib.bigquery module

class luigi.contrib.bigquery.**CreateDisposition**
Bases: object

CREATE_IF_NEEDED = 'CREATE_IF_NEEDED'

CREATE_NEVER = 'CREATE_NEVER'

class luigi.contrib.bigquery.**WriteDisposition**
Bases: object

WRITE_TRUNCATE = 'WRITE_TRUNCATE'

WRITE_APPEND = 'WRITE_APPEND'

WRITE_EMPTY = 'WRITE_EMPTY'

class luigi.contrib.bigquery.**QueryMode**
Bases: object

INTERACTIVE = 'INTERACTIVE'

BATCH = 'BATCH'

class luigi.contrib.bigquery.**SourceFormat**
Bases: object

AVRO = 'AVRO'

CSV = 'CSV'

DATASTORE_BACKUP = 'DATASTORE_BACKUP'

NEWLINE_DELIMITED_JSON = 'NEWLINE_DELIMITED_JSON'

class luigi.contrib.bigquery.**FieldDelimiter**
Bases: object

The separator for fields in a CSV file. The separator can be any ISO-8859-1 single-byte character. To use a character in the range 128-255, you must encode the character as UTF8. BigQuery converts the string to ISO-8859-1 encoding, and then uses the first byte of the encoded string to split the data in its raw, binary state. BigQuery also supports the escape sequence " " to specify a tab separator. The default value is a comma (',').

https://cloud.google.com/bigquery/docs/reference/v2/jobs#configuration.load

COMMA = ','

TAB = '\t'

PIPE = '|'

class luigi.contrib.bigquery.**PrintHeader**
Bases: object

TRUE = True

FALSE = False

class luigi.contrib.bigquery.**DestinationFormat**
Bases: object

AVRO = 'AVRO'

CSV = 'CSV'

NEWLINE_DELIMITED_JSON = 'NEWLINE_DELIMITED_JSON'

class luigi.contrib.bigquery.**Compression**
Bases: object

GZIP = 'GZIP'

NONE = 'NONE'

class luigi.contrib.bigquery.**Encoding**
Bases: object

[Optional] The character encoding of the data. The supported values are UTF-8 or ISO-8859-1. The default value is UTF-8.

BigQuery decodes the data after the raw, binary data has been split using the values of the quote and fieldDelimiter properties.

UTF_8 = 'UTF-8'

ISO_8859_1 = 'ISO-8859-1'

class luigi.contrib.bigquery.**BQDataset**(*project_id*, *dataset_id*, *location*)
Bases: tuple

Create new instance of BQDataset(project_id, dataset_id, location)

dataset_id
Alias for field number 1

location
Alias for field number 2

project_id
Alias for field number 0

class luigi.contrib.bigquery.**BQTable**
Bases: *luigi.contrib.bigquery.BQTable*

Create new instance of BQTable(project_id, dataset_id, table_id, location)

dataset

uri

class `luigi.contrib.bigquery.`**`BigQueryClient`**(*oauth_credentials=None*, *descriptor=”*, *http_=None*)

Bases: `object`

A client for Google BigQuery.

For details of how authentication and the descriptor work, see the documentation for the GCS client. The descriptor URL for BigQuery is https://www.googleapis.com/discovery/v1/apis/bigquery/v2/rest

`dataset_exists`(*dataset*)

Returns whether the given dataset exists. If regional location is specified for the dataset, that is also checked to be compatible with the remote dataset, otherwise an exception is thrown.

param dataset

type dataset BQDataset

`table_exists`(*table*)

Returns whether the given table exists.

Parameters **`table`** (`BQTable`) –

`make_dataset`(*dataset*, *raise_if_exists=False*, *body=None*)

Creates a new dataset with the default permissions.

Parameters

- **`dataset`** (`BQDataset`) –
- **`raise_if_exists`** – whether to raise an exception if the dataset already exists.

Raises ***`luigi.target.FileAlreadyExists`*** – if raise_if_exists=True and the dataset exists

`delete_dataset`(*dataset*, *delete_nonempty=True*)

Deletes a dataset (and optionally any tables in it), if it exists.

Parameters

- **`dataset`** (`BQDataset`) –
- **`delete_nonempty`** – if true, will delete any tables before deleting the dataset

`delete_table`(*table*)

Deletes a table, if it exists.

Parameters **`table`** (`BQTable`) –

`list_datasets`(*project_id*)

Returns the list of datasets in a given project.

Parameters **`project_id`** (*`str`*) –

`list_tables`(*dataset*)

Returns the list of tables in a given dataset.

Parameters **`dataset`** (`BQDataset`) –

`get_view`(*table*)

Returns the SQL query for a view, or None if it doesn’t exist or is not a view.

Parameters **`table`** (`BQTable`) – The table containing the view.

`update_view`(*table*, *view*)

Updates the SQL query for a view.

If the output table exists, it is replaced with the supplied view query. Otherwise a new table is created with this view.

Parameters

- **`table`** (`BQTable`) – The table to contain the view.
- **`view`** (*`str`*) – The SQL query for the view.

`run_job`(*project_id*, *body*, *dataset=None*)

Runs a BigQuery "job". See the documentation for the format of body.

Note: You probably don't need to use this directly. Use the tasks defined below.

Parameters **`dataset`** (`BQDataset`) –

`copy`(*source_table*, *dest_table*, *create_disposition='CREATE_IF_NEEDED'*, *write_disposition='WRITE_TRUNCATE'*)

Copies (or appends) a table to another table.

Parameters

- **`source_table`** (`BQTable`) –
- **`dest_table`** (`BQTable`) –
- **`create_disposition`** (`CreateDisposition`) – whether to create the table if needed
- **`write_disposition`** (`WriteDisposition`) – whether to append/truncate/fail if the table exists

`class` `luigi.contrib.bigquery.`**`BigQueryTarget`**(*project_id*, *dataset_id*, *table_id*, *client=None*, *location=None*)

Bases: *`luigi.target.Target`*

`classmethod from_bqtable`(*table*, *client=None*)

A constructor that takes a *`BQTable`*.

Parameters **`table`** (`BQTable`) –

`exists`()

Returns `True` if the `Target` exists and `False` otherwise.

`class` `luigi.contrib.bigquery.`**`MixinBigQueryBulkComplete`**

Bases: `object`

Allows to efficiently check if a range of BigQueryTargets are complete. This enables scheduling tasks with luigi range tools.

If you implement a custom Luigi task with a BigQueryTarget output, make sure to also inherit from this mixin to enable range support.

`classmethod bulk_complete`(*parameter_tuples*)

`class` `luigi.contrib.bigquery.`**`BigQueryLoadTask`**(**args*, ***kwargs*)

Bases: *`luigi.contrib.bigquery.MixinBigQueryBulkComplete`*, *`luigi.task.Task`*

Load data into BigQuery from GCS.

`source_format`

The source format to use (see *`SourceFormat`*).

encoding
The encoding of the data that is going to be loaded (see *Encoding*).

write_disposition
What to do if the table already exists. By default this will fail the job.

See *WriteDisposition*

schema
Schema in the format defined at https://cloud.google.com/bigquery/docs/reference/v2/jobs#configuration.load.schema.

If the value is falsy, it is omitted and inferred by BigQuery.

max_bad_records
The maximum number of bad records that BigQuery can ignore when reading data.

If the number of bad records exceeds this value, an invalid error is returned in the job result.

field_delimiter
The separator for fields in a CSV file. The separator can be any ISO-8859-1 single-byte character.

source_uris()
The fully-qualified URIs that point to your data in Google Cloud Storage.

Each URI can contain one '*' wildcard character and it must come after the 'bucket' name.

skip_leading_rows
The number of rows at the top of a CSV file that BigQuery will skip when loading the data.

The default value is 0. This property is useful if you have header rows in the file that should be skipped.

allow_jagged_rows
Accept rows that are missing trailing optional columns. The missing values are treated as nulls.

If false, records with missing trailing columns are treated as bad records, and if there are too many bad records,

an invalid error is returned in the job result. The default value is false. Only applicable to CSV, ignored for other formats.

ignore_unknown_values
Indicates if BigQuery should allow extra values that are not represented in the table schema.

If true, the extra values are ignored. If false, records with extra columns are treated as bad records,

and if there are too many bad records, an invalid error is returned in the job result. The default value is false.

The sourceFormat property determines what BigQuery treats as an extra value:

CSV: Trailing columns JSON: Named values that don't match any column names

allow_quoted_new_lines
Indicates if BigQuery should allow quoted data sections that contain newline characters in a CSV file. The default value is false.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

class luigi.contrib.bigquery.**BigQueryRunQueryTask**(**args*, ***kwargs*)
Bases: *luigi.contrib.bigquery.MixinBigQueryBulkComplete*, *luigi.task.Task*

write_disposition
What to do if the table already exists. By default this will fail the job.

See `WriteDisposition`

create_disposition
Whether to create the table or not. See `CreateDisposition`

flatten_results
Flattens all nested and repeated fields in the query results. allowLargeResults must be true if this is set to False.

query
The query, in text form.

query_mode
The query mode. See `QueryMode`.

udf_resource_uris
Iterator of code resource to load from a Google Cloud Storage URI (gs://bucket/path).

use_legacy_sql
Whether to use legacy SQL

run()
The task run method, to be overridden in a subclass.

See *Task.run*

class luigi.contrib.bigquery.**BigQueryCreateViewTask**(**args*, ***kwargs*)
Bases: `luigi.task.Task`

Creates (or updates) a view in BigQuery.

The output of this task needs to be a BigQueryTarget. Instances of this class should specify the view SQL in the view property.

If a view already exist in BigQuery at output(), it will be updated.

view
The SQL query for the view, in text form.

complete()
If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

class luigi.contrib.bigquery.**ExternalBigQueryTask**(**args*, ***kwargs*)
Bases: `luigi.contrib.bigquery.MixinBigQueryBulkComplete`, `luigi.task.ExternalTask`

An external task for a BigQuery target.

class luigi.contrib.bigquery.**BigQueryExtractTask**(**args*, ***kwargs*)
Bases: `luigi.task.Task`

Extracts (unloads) a table from BigQuery to GCS.

This tasks requires the input to be exactly one BigQueryTarget while the output should be one or more GCSTargets from luigi.contrib.gcs depending on the use of destinationUris property.

destination_uris
The fully-qualified URIs that point to your data in Google Cloud Storage. Each URI can contain one '*' wildcard character and it must come after the 'bucket' name.

Wildcarded destinationUris in GCSQueryTarget might not be resolved correctly and result in incomplete data. If a GCSQueryTarget is used to pass wildcarded destinationUris be sure to overwrite this property to suppress the warning.

print_header
Whether to print the header or not.

field_delimiter
The separator for fields in a CSV file. The separator can be any ISO-8859-1 single-byte character.

destination_format
The destination format to use (see *DestinationFormat*).

compression
Whether to use compression.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

luigi.contrib.bigquery.**BigqueryClient**
alias of *luigi.contrib.bigquery.BigQueryClient*

luigi.contrib.bigquery.**BigqueryTarget**
alias of *luigi.contrib.bigquery.BigQueryTarget*

luigi.contrib.bigquery.**MixinBigqueryBulkComplete**
alias of *luigi.contrib.bigquery.MixinBigQueryBulkComplete*

luigi.contrib.bigquery.**BigqueryLoadTask**
alias of *luigi.contrib.bigquery.BigQueryLoadTask*

luigi.contrib.bigquery.**BigqueryRunQueryTask**
alias of *luigi.contrib.bigquery.BigQueryRunQueryTask*

luigi.contrib.bigquery.**BigqueryCreateViewTask**
alias of *luigi.contrib.bigquery.BigQueryCreateViewTask*

luigi.contrib.bigquery.**ExternalBigqueryTask**
alias of *luigi.contrib.bigquery.ExternalBigQueryTask*

luigi.contrib.bigquery_avro module

Specialized tasks for handling Avro data in BigQuery from GCS.

class luigi.contrib.bigquery_avro.**BigQueryLoadAvro**(**args*, ***kwargs*)
Bases: *luigi.contrib.bigquery.BigQueryLoadTask*

A helper for loading specifically Avro data into BigQuery from GCS.

Copies table level description from Avro schema doc, BigQuery internally will copy field-level descriptions to the table.

Suitable for use via subclassing: override requires() to return Task(s) that output to GCS Targets; their paths are expected to be URIs of .avro files or URI prefixes (GCS "directories") containing one or many .avro files.

Override output() to return a BigQueryTarget representing the destination table.

source_format = 'AVRO'

source_uris()
The fully-qualified URIs that point to your data in Google Cloud Storage.

Each URI can contain one '*' wildcard character and it must come after the 'bucket' name.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

luigi.contrib.datadog_metric module

class luigi.contrib.datadog_metric.**datadog**(**args*, ***kwargs*)
Bases: `luigi.task.Config`

api_key = Parameter (defaults to dummy_api_key): API key provided by Datadog

app_key = Parameter (defaults to dummy_app_key): APP key provided by Datadog

default_tags = Parameter (defaults to application:luigi): Default tags for every even

environment = Parameter (defaults to development): Environment of which the pipeline

metric_namespace = Parameter (defaults to luigi): Default namespace for events and me

statsd_host = Parameter (defaults to localhost): StatsD host implementing the Datadog

statsd_port = IntParameter (defaults to 8125): StatsD port implementing the Datadog s

class luigi.contrib.datadog_metric.**DatadogMetricsCollector**(**args*, ***kwargs*)
Bases: `luigi.metrics.MetricsCollector`

handle_task_started(*task*)

handle_task_failed(*task*)

handle_task_disabled(*task*, *config*)

handle_task_done(*task*)

default_tags

luigi.contrib.dataproc module

luigi bindings for Google Dataproc on Google Cloud

luigi.contrib.dataproc.**get_dataproc_client**()

luigi.contrib.dataproc.**set_dataproc_client**(*client*)

class luigi.contrib.dataproc.**DataprocBaseTask**(**args*, ***kwargs*)
Bases: `luigi.contrib.dataproc._DataprocBaseTask`

Base task for running jobs in Dataproc. It is recommended to use one of the tasks specific to your job type. Extend this class if you need fine grained control over what kind of job gets submitted to your Dataproc cluster.

submit_job(*job_config*)

submit_spark_job(*jars*, *main_class*, *job_args=None*)

submit_pyspark_job(*job_file*, *extra_files=[]*, *job_args=None*)

wait_for_job()

class luigi.contrib.dataproc.**DataprocSparkTask**(**args*, ***kwargs*)

Bases: *luigi.contrib.dataproc.DataprocBaseTask*

Runs a spark jobs on your Dataproc cluster

main_class = Parameter

jars = Parameter (defaults to)

job_args = Parameter (defaults to)

run()

The task run method, to be overridden in a subclass.

See *Task.run*

class luigi.contrib.dataproc.**DataprocPysparkTask**(**args*, ***kwargs*)

Bases: *luigi.contrib.dataproc.DataprocBaseTask*

Runs a pyspark jobs on your Dataproc cluster

job_file = Parameter

extra_files = Parameter (defaults to)

job_args = Parameter (defaults to)

run()

The task run method, to be overridden in a subclass.

See *Task.run*

class luigi.contrib.dataproc.**CreateDataprocClusterTask**(**args*, ***kwargs*)

Bases: luigi.contrib.dataproc._DataprocBaseTask

Task for creating a Dataproc cluster.

gcloud_zone = Parameter (defaults to europe-west1-c)

gcloud_network = Parameter (defaults to default)

master_node_type = Parameter (defaults to n1-standard-2)

master_disk_size = Parameter (defaults to 100)

worker_node_type = Parameter (defaults to n1-standard-2)

worker_disk_size = Parameter (defaults to 100)

worker_normal_count = Parameter (defaults to 2)

worker_preemptible_count = Parameter (defaults to 0)

image_version = Parameter (defaults to)

complete()

If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

run()

The task run method, to be overridden in a subclass.

See *Task.run*

class luigi.contrib.dataproc.**DeleteDataprocClusterTask**(**args*, ***kwargs*)

Bases: luigi.contrib.dataproc._DataprocBaseTask

Task for deleting a Dataproc cluster. One of the uses for this class is to extend it and have it require a Dataproc task that does a calculation and have that task extend the cluster creation task. This allows you to create chains where you create a cluster, run your job and remove the cluster right away. (Store your input and output files in gs://… instead of hdfs://… if you do this).

complete()

If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

run()

The task run method, to be overridden in a subclass.

See *Task.run*

luigi.contrib.docker_runner module

Docker container wrapper for Luigi.

Enables running a docker container as a task in luigi. This wrapper uses the Docker Python SDK to communicate directly with the Docker API avoiding the common pattern to invoke the docker client from the command line. Using the SDK it is possible to detect and properly handle errors occurring when pulling, starting or running the containers. On top of this, it is possible to mount a single file in the container and a temporary directory is created on the host and mounted allowing the handling of files bigger than the container limit.

Requires:

- docker: `pip install docker`

Written and maintained by Andrea Pierleoni (@apierleoni). Contributions by Eliseo Papa (@elipapa).

class luigi.contrib.docker_runner.**DockerTask**(**args*, ***kwargs*)

Bases: *luigi.task.Task*

When a new instance of the DockerTask class gets created: - call the parent class __init__ method - start the logger - init an instance of the docker client - create a tmp dir - add the temp dir to the volume binds specified in the task

image

command

name

container_options

environment

container_tmp_dir

binds

Override this to mount local volumes, in addition to the /tmp/luigi which gets defined by default. This should return a list of strings. e.g. [‘/hostpath1:/containerpath1’, ‘/hostpath2:/containerpath2’]

network_mode

docker_url

auto_remove

force_pull

mount_tmp

run()
The task run method, to be overridden in a subclass.

See *Task.run*

luigi.contrib.dropbox module

luigi.contrib.dropbox.**accept_trailing_slash_in_existing_dirpaths**(*func*)

luigi.contrib.dropbox.**accept_trailing_slash**(*func*)

class luigi.contrib.dropbox.**DropboxClient**(*token*, *user_agent='Luigi'*)
Bases: *luigi.target.FileSystem*

Dropbox client for authentication, designed to be used by the *DropboxTarget* class.

Parameters **token** (*str*) – Dropbox Oauth2 Token. See *DropboxTarget* for more information about generating a token

exists(*path*, **args*, ***kwargs*)
Return `True` if file or directory at `path` exist, `False` otherwise

Parameters **path** (*str*) – a path within the FileSystem to check for existence.

remove(*path*, **args*, ***kwargs*)
Remove file or directory at location `path`

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

mkdir(*path*, **args*, ***kwargs*)
Create directory at location `path`

Creates the directory at `path` and implicitly create parent directories if they do not already exist.

Parameters

- **path** (*str*) – a path within the FileSystem to create as a directory.
- **parents** (*bool*) – Create parent directories when necessary. When parents=False and the parent directory doesn't exist, raise luigi.target.MissingParentDirectory
- **raise_if_exists** (*bool*) – raise luigi.target.FileAlreadyExists if the folder already exists.

isdir(*path*, **args*, ***kwargs*)
Return `True` if the location at `path` is a directory. If not, return `False`.

Parameters **path** (*str*) – a path within the FileSystem to check as a directory.

Note: This method is optional, not all FileSystem subclasses implements it.

listdir(*path*, **args*, ***kwargs*)
Return a list of files rooted in path.

This returns an iterable of the files rooted at `path`. This is intended to be a recursive listing.

Parameters **path** (*str*) – a path within the FileSystem to list.

Note: This method is optional, not all FileSystem subclasses implements it.

move (*path*, **args*, ***kwargs*)
Move a file, as one would expect.

copy (*path*, **args*, ***kwargs*)
Copy a file or a directory with contents. Currently, LocalFileSystem and MockFileSystem support only single file copying but S3Client copies either a file or a directory as required.

download_as_bytes (*path*)

upload (*tmp_path*, *dest_path*)

class luigi.contrib.dropbox.**ReadableDropboxFile** (*path*, *client*)
Bases: `object`

Represents a file inside the Dropbox cloud which will be read

Parameters

- **path** (*str*) – Dropbpx path of the file to be read (always starting with /)
- **client** (`DropboxClient`) – a DropboxClient object (initialized with a valid token)

read ()

close ()

readable ()

writable ()

seekable ()

class luigi.contrib.dropbox.**AtomicWritableDropboxFile** (*path*, *client*)
Bases: *luigi.target.AtomicLocalFile*

Represents a file that will be created inside the Dropbox cloud

Parameters

- **path** (*str*) – Destination path inside Dropbox
- **client** (`DropboxClient`) – a DropboxClient object (initialized with a valid token, for the desired account)

move_to_final_destination ()
After editing the file locally, this function uploads it to the Dropbox cloud

class luigi.contrib.dropbox.**DropboxTarget** (*path*, *token*, *format=None*, *user_agent='Luigi'*)
Bases: *luigi.target.FileSystemTarget*

A Dropbox filesystem target.

Create an Dropbox Target for storing data in a dropbox.com account

About the path parameter

The path must start with '/' and should not end with '/' (even if it is a directory). The path must not contain adjacent slashes ('/files//img.jpg' is an invalid path)

If the app has 'App folder' access, then / will refer to this app folder (which mean that there is no need to prepend the name of the app to the path) Otherwise, if the app has 'full access', then / will refer to the root of the Dropbox folder

About the token parameter:

The Dropbox target requires a valid OAuth2 token as a parameter (which means that a Dropbox API app must be created. This app can have 'App folder' access or 'Full Dropbox', as desired).

Information about generating the token can be read here:

- https://dropbox-sdk-python.readthedocs.io/en/latest/api/oauth.html#dropbox.oauth.DropboxOAuth2Flow
- https://blogs.dropbox.com/developers/2014/05/generate-an-access-token-for-your-own-account/

Parameters

- **path** (*str*) – Remote path in Dropbox (starting with '/').
- **token** (*str*) – a valid OAuth2 Dropbox token.
- **format** (*luigi.Format*) – the luigi format to use (e.g. *luigi.format.Nop*)

fs

temporary_path(***kwds*)

A context manager that enables a reasonably short, general and magic-less way to solve the *Atomic Writes Problem*.

- On *entering*, it will create the parent directories so the temporary_path is writeable right away. This step uses `FileSystem.mkdir()`.
- On *exiting*, it will move the temporary file if there was no exception thrown. This step uses `FileSystem.rename_dont_move()`

The file system operations will be carried out by calling them on *fs*.

The typical use case looks like this:

```
class MyTask(luigi.Task):
    def output(self):
        return MyFileSystemTarget(...)

    def run(self):
        with self.output().temporary_path() as self.temp_output_path:
            run_some_external_command(output_path=self.temp_output_path)
```

open(*mode*)

Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters mode (*str*) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

luigi.contrib.ecs module

EC2 Container Service wrapper for Luigi

From the AWS website:

> Amazon EC2 Container Service (ECS) is a highly scalable, high performance container management service that supports Docker containers and allows you to easily run applications on a managed cluster of Amazon EC2 instances.

To use ECS, you create a taskDefinition JSON that defines the docker run command for one or more containers in a task or service, and then submit this JSON to the API to run the task.

This boto3-powered wrapper allows you to create Luigi Tasks to submit ECS `taskDefinition` s. You can either pass a dict (mapping directly to the `taskDefinition` JSON) OR an Amazon Resource Name (arn) for a previously registered `taskDefinition`.

Requires:

- boto3 package
- Amazon AWS credentials discoverable by boto3 (e.g., by using `aws configure` from awscli)
- A running ECS cluster (see ECS Get Started)

Written and maintained by Jake Feala (@jfeala) for Outlier Bio (@outlierbio)

class luigi.contrib.ecs.**ECSTask**(**args*, ***kwargs*)

Bases: *luigi.task.Task*

Base class for an Amazon EC2 Container Service Task

Amazon ECS requires you to register "tasks", which are JSON descriptions for how to issue the `docker run` command. This Luigi Task can either run a pre-registered ECS taskDefinition, OR register the task on the fly from a Python dict.

Parameters

- **task_def_arn** – pre-registered task definition ARN (Amazon Resource Name), of the form:

```
arn:aws:ecs:<region>:<user_id>:task-definition/<family>:<tag>
```

- **task_def** – dict describing task in taskDefinition JSON format, for example:

```
task_def = {
    'family': 'hello-world',
    'volumes': [],
    'containerDefinitions': [
        {
            'memory': 1,
            'essential': True,
            'name': 'hello-world',
            'image': 'ubuntu',
            'command': ['/bin/echo', 'hello world']
        }
    ]
}
```

- **cluster** – str defining the ECS cluster to use. When this is not defined it will use the default one.

task_def_arn = OptionalParameter (defaults to None)

task_def = OptionalParameter (defaults to None)

cluster = Parameter (defaults to default)

ecs_task_ids

Expose the ECS task ID

command

Command passed to the containers

Override to return list of dicts with keys 'name' and 'command', describing the container names and commands to pass to the container. Directly corresponds to the *overrides* parameter of runTask API. For example:

```
[
    {
        'name': 'myContainer',
        'command': ['/bin/sleep', '60']
    }
]
```

run()

The task run method, to be overridden in a subclass.

See *Task.run*

luigi.contrib.esindex module

Support for Elasticsearch (1.0.0 or newer).

Provides an `ElasticsearchTarget` and a `CopyToIndex` template task.

Modeled after `luigi.contrib.rdbms.CopyToTable`.

A minimal example (assuming elasticsearch is running on localhost:9200):

```
class ExampleIndex(CopyToIndex):
    index = 'example'

    def docs(self):
        return [{'_id': 1, 'title': 'An example document.'}]

if __name__ == '__main__':
    task = ExampleIndex()
    luigi.build([task], local_scheduler=True)
```

All options:

```
class ExampleIndex(CopyToIndex):
    host = 'localhost'
    port = 9200
    index = 'example'
    doc_type = 'default'
    purge_existing_index = True
    marker_index_hist_size = 1

    def docs(self):
        return [{'_id': 1, 'title': 'An example document.'}]

if __name__ == '__main__':
    task = ExampleIndex()
    luigi.build([task], local_scheduler=True)
```

Host, *port*, *index*, *doc_type* parameters are standard elasticsearch.

purge_existing_index will delete the index, whenever an update is required. This is useful, when one deals with "dumps" that represent the whole data, not just updates.

marker_index_hist_size sets the maximum number of entries in the 'marker' index:

- 0 (default) keeps all updates,
- 1 to only remember the most recent update to the index.

This can be useful, if an index needs to recreated, even though the corresponding indexing task has been run sometime in the past - but a later indexing task might have altered the index in the meantime.

There are a two luigi *luigi.cfg* configuration options:

```
[elasticsearch]

marker-index = update_log
marker-doc-type = entry
```

class luigi.contrib.esindex.**ElasticsearchTarget**(*host*, *port*, *index*, *doc_type*, *update_id*, *marker_index_hist_size=0*, *http_auth=None*, *timeout=10*, *extra_elasticsearch_args=None*)

Bases: *luigi.target.Target*

Target for a resource in Elasticsearch.

Parameters

- **host** (*str*) – Elasticsearch server host
- **port** (*int*) – Elasticsearch server port
- **index** (*str*) – index name
- **doc_type** (*str*) – doctype name
- **update_id** (*str*) – an identifier for this data set
- **marker_index_hist_size** (*int*) – list of changes to the index to remember
- **timeout** (*int*) – Elasticsearch connection timeout
- **extra_elasticsearch_args** – extra args for Elasticsearch

marker_index = 'update_log'

marker_doc_type = 'entry'

marker_index_document_id()

Generate an id for the indicator document.

touch()

Mark this update as complete.

The document id would be sufficient but, for documentation, we index the parameters *update_id*, *target_index*, *target_doc_type* and *date* as well.

exists()

Test, if this task has been run.

create_marker_index()

Create the index that will keep track of the tasks if necessary.

ensure_hist_size()

Shrink the history of updates for a *index/doc_type* combination down to *self.marker_index_hist_size*.

class luigi.contrib.esindex.**CopyToIndex**(**args*, ***kwargs*)

Bases: *luigi.task.Task*

Template task for inserting a data set into Elasticsearch.

Usage:

1. Subclass and override the required *index* attribute.
2. Implement a custom *docs* method, that returns an iterable over the documents. A document can be a JSON string, e.g. from a newline-delimited JSON (ldj) file (default implementation) or some dictionary.

Optional attributes:

- doc_type (default),
- host (localhost),
- port (9200),
- settings ({'settings': {}})
- mapping (None),
- chunk_size (2000),
- raise_on_error (True),
- purge_existing_index (False),
- marker_index_hist_size (0)

If settings are defined, they are only applied at index creation time.

host
ES hostname.

port
ES port.

http_auth
ES optional http auth information as either ':' separated string or a tuple, e.g. *('user', 'pass')* or *"user:pass"*.

index
The target index.

May exist or not.

doc_type
The target doc_type.

mapping
Dictionary with custom mapping or *None*.

settings
Settings to be used at index creation time.

chunk_size
Single API call for this number of docs.

raise_on_error
Whether to fail fast.

purge_existing_index
Whether to delete the *index* completely before any indexing.

marker_index_hist_size
Number of event log entries in the marker index. 0: unlimited.

timeout
Timeout.

extra_elasticsearch_args
Extra arguments to pass to the Elasticsearch constructor

docs()
Return the documents to be indexed.

Beside the user defined fields, the document may contain an *_index*, *_type* and *_id*.

create_index()
Override to provide code for creating the target index.

By default it will be created without any special settings or mappings.

delete_index()
Delete the index, if it exists.

update_id()
This id will be a unique identifier for this indexing task.

output()
Returns a ElasticsearchTarget representing the inserted dataset.

Normally you don't override this.

run()
Run task, namely:

- purge existing index, if requested (*purge_existing_index*),
- create the index, if missing,
- apply mappings, if given,
- set refresh interval to -1 (disable) for performance reasons,
- bulk index in batches of size *chunk_size* (2000),
- set refresh interval to 1s,
- refresh Elasticsearch,
- create entry in marker index.

luigi.contrib.external_daily_snapshot module

class luigi.contrib.external_daily_snapshot.**ExternalDailySnapshot**(**args*, ***kwargs*)

Bases: *luigi.task.ExternalTask*

Abstract class containing a helper method to fetch the latest snapshot.

Example:

```
class MyTask(luigi.Task):
  def requires(self):
    return PlaylistContent.latest()
```

All tasks subclassing *ExternalDailySnapshot* must have a *luigi.DateParameter* named `date`.

You can also provide additional parameters to the class and also configure lookback size.

Example:

```
ServiceLogs.latest(service="radio", lookback=21)
```

date = DateParameter

classmethod latest (**args*, ***kwargs*)
This is cached so that requires() is deterministic.

luigi.contrib.external_program module

Template tasks for running external programs as luigi tasks.

This module is primarily intended for when you need to call a single external program or shell script, and it's enough to specify program arguments and environment variables.

If you need to run multiple commands, chain them together or pipe output from one command to the next, you're probably better off using something like plumbum, and wrapping plumbum commands in normal luigi `Task` s.

class `luigi.contrib.external_program.`**ExternalProgramTask** (**args*, ***kwargs*)
Bases: `luigi.task.Task`

Template task for running an external program in a subprocess

The program is run using `subprocess.Popen`, with `args` passed as a list, generated by `program_args()` (where the first element should be the executable). See `subprocess.Popen` for details.

Your must override `program_args()` to specify the arguments you want, and you can optionally override `program_environment()` if you want to control the environment variables (see `ExternalPythonProgramTask` for an example).

By default, the output (stdout and stderr) of the run external program is being captured and displayed after the execution has ended. This behaviour can be overridden by passing `--capture-output False`

capture_output = Insignificant BoolParameter (defaults to True)

stream_for_searching_tracking_url = Insignificant ChoiceParameter (defaults to none):
Used for defining which stream should be tracked for URL, may be set to 'stdout', 'stderr' or 'none'.

Default value is 'none', so URL tracking is not performed.

tracking_url_pattern = Insignificant OptionalParameter (defaults to None): Regex patt
Regex pattern used for searching URL in the logs of the external program.

If a log line matches the regex, the first group in the matching is set as the tracking URL for the job in the web UI. Example: 'Job UI is here: (https?://.*)'.

Default value is None, so URL tracking is not performed.

program_args ()
Override this method to map your task parameters to the program arguments

Returns list to pass as `args` to `subprocess.Popen`

program_environment ()
Override this method to control environment variables for the program

Returns dict mapping environment variable names to values

always_log_stderr
When True, stderr will be logged even if program execution succeeded

Override to False to log stderr only when program execution fails.

build_tracking_url(*logs_output*)
This method is intended for transforming pattern match in logs to an URL :param logs_output: Found match of *self.tracking_url_pattern* :return: a tracking URL for the task

run()
The task run method, to be overridden in a subclass.

See *Task.run*

class luigi.contrib.external_program.**ExternalProgramRunContext**(*proc*)
Bases: object

kill_job(*captured_signal=None*, *stack_frame=None*)

exception luigi.contrib.external_program.**ExternalProgramRunError**(*message*, *args*, *env=None*, *std-out=None*, *stderr=None*)
Bases: exceptions.RuntimeError

class luigi.contrib.external_program.**ExternalPythonProgramTask**(**args*, ***kwargs*)
Bases: *luigi.contrib.external_program.ExternalProgramTask*

Template task for running an external Python program in a subprocess

Simple extension of *ExternalProgramTask*, adding two *luigi.parameter.Parameter* s for setting a virtualenv and for extending the PYTHONPATH.

virtualenv = Parameter (defaults to None): path to the virtualenv directory to use. I

extra_pythonpath = Parameter (defaults to None): extend the search path for modules b

program_environment()
Override this method to control environment variables for the program

Returns dict mapping environment variable names to values

luigi.contrib.ftp module

This library is a wrapper of ftplib or pysftp. It is convenient to move data from/to (S)FTP servers.

There is an example on how to use it (example/ftp_experiment_outputs.py)

You can also find unittest for each class.

Be aware that normal ftp does not provide secure communication.

class luigi.contrib.ftp.**RemoteFileSystem**(*host*, *username=None*, *password=None*, *port=None*, *tls=False*, *timeout=60*, *sftp=False*, *pysftp_conn_kwargs=None*)
Bases: *luigi.target.FileSystem*

exists(*path*, *mtime=None*)
Return *True* if file or directory at *path* exist, False otherwise.

Additional check on modified time when mtime is passed in.

Return False if the file's modified time is older mtime.

remove(*path*, *recursive=True*)
Remove file or directory at location path.

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

put (*local_path*, *path*, *atomic=True*)
Put file from local filesystem to (s)FTP.

get (*path*, *local_path*)
Download file from (s)FTP to local filesystem.

listdir (*path='.'*)
Gets an list of the contents of path in (s)FTP

class `luigi.contrib.ftp.`**AtomicFtpFile** (*fs*, *path*)
Bases: *luigi.target.AtomicLocalFile*

Simple class that writes to a temp file and upload to ftp on close().

Also cleans up the temp file if close is not invoked.

Initializes an AtomicFtpfile instance. :param fs: :param path: :type path: str

move_to_final_destination ()

fs

class `luigi.contrib.ftp.`**RemoteTarget** (*path*, *host*, *format=None*, *username=None*, *password=None*, *port=None*, *mtime=None*, *tls=False*, *timeout=60*, *sftp=False*, *pysftp_conn_kwargs=None*)
Bases: *luigi.target.FileSystemTarget*

Target used for reading from remote files.

The target is implemented using intermediate files on the local system. On Python2, these files may not be cleaned up.

fs

open (*mode*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters **mode** (*str*) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options.

exists ()
Returns `True` if the path for this FileSystemTarget exists; `False` otherwise.

This method is implemented by using *fs*.

put (*local_path*, *atomic=True*)

get (*local_path*)

luigi.contrib.gcp module

Common code for GCP (google cloud services) integration luigi.contrib.gcp.**get_authenticate_kwargs**(*oauth_credentials=None*, *http_=None*)

Returns a dictionary with keyword arguments for use with discovery

Prioritizes oauth_credentials or a http client provided by the user If none provided, falls back to default credentials provided by google's command line utilities. If that also fails, tries using httplib2.Http()

Used by *gcs.GCSClient* and *bigquery.BigQueryClient* to initiate the API Client

luigi.contrib.gcs module

luigi bindings for Google Cloud Storage

exception luigi.contrib.gcs.**InvalidDeleteException**

Bases: `luigi.target.FileSystemException`

class luigi.contrib.gcs.**GCSClient**(*oauth_credentials=None*, *descriptor=''*, *http_=None*, *chunksize=10485760*, ***discovery_build_kwargs*)

Bases: `luigi.target.FileSystem`

An implementation of a FileSystem over Google Cloud Storage.

There are several ways to use this class. By default it will use the app default credentials, as described at https://developers.google.com/identity/protocols/application-default-credentials . Alternatively, you may pass an google-auth credentials object. e.g. to use a service account:

```
 credentials = google.auth.jwt.Credentials.from_service_account_info(
     '012345678912-ThisIsARandomServiceAccountEmail@developer.
↪gserviceaccount.com',
     'These are the contents of the p12 file that came with the service␣
↪account',
     scope='https://www.googleapis.com/auth/devstorage.read_write')
 client = GCSClient(oauth_credentials=credentails)

The chunksize parameter specifies how much data to transfer when␣
↪downloading
or uploading files.
```

Warning: By default this class will use "automated service discovery" which will require a connection to the web. The google api client downloads a JSON file to "create" the library interface on the fly. If you want a more hermetic build, you can pass the contents of this file (currently found at https://www.googleapis.com/discovery/v1/apis/storage/v1/rest) as the `descriptor` argument.

exists(*path*)

Return `True` if file or directory at `path` exist, `False` otherwise

Parameters path (`str`) – a path within the FileSystem to check for existence.

isdir(*path*)

Return `True` if the location at `path` is a directory. If not, return `False`.

Parameters path (`str`) – a path within the FileSystem to check as a directory.

Note: This method is optional, not all FileSystem subclasses implements it.

remove(*path*, *recursive=True*)

Remove file or directory at location `path`

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

put (*filename*, *dest_path*, *mimetype=None*, *chunksize=None*)

put_multiple (*filepaths*, *remote_directory*, *mimetype=None*, *chunksize=None*, *num_process=1*)

put_string (*contents*, *dest_path*, *mimetype=None*)

mkdir (*path*, *parents=True*, *raise_if_exists=False*)
Create directory at location `path`

Creates the directory at `path` and implicitly create parent directories if they do not already exist.

Parameters

- **path** (*str*) – a path within the FileSystem to create as a directory.
- **parents** (*bool*) – Create parent directories when necessary. When parents=False and the parent directory doesn't exist, raise luigi.target.MissingParentDirectory
- **raise_if_exists** (*bool*) – raise luigi.target.FileAlreadyExists if the folder already exists.

copy (*source_path*, *destination_path*)
Copy a file or a directory with contents. Currently, LocalFileSystem and MockFileSystem support only single file copying but S3Client copies either a file or a directory as required.

rename (**args*, ***kwargs*)
Alias for `move()`

move (*source_path*, *destination_path*)
Rename/move an object from one GCS location to another.

listdir (*path*)
Get an iterable with GCS folder contents. Iterable contains paths relative to queried path.

list_wildcard (*wildcard_path*)
Yields full object URIs matching the given wildcard.

Currently only the '*' wildcard after the last path delimiter is supported.

(If we need "full" wildcard functionality we should bring in gsutil dependency with its https://github.com/GoogleCloudPlatform/gsutil/blob/master/gslib/wildcard_iterator.py. . .)

download (*path*, *chunksize=None*, *chunk_callback=<function <lambda>>*)
Downloads the object contents to local file system.

Optionally stops after the first chunk for which chunk_callback returns True.

class `luigi.contrib.gcs.`**AtomicGCSFile** (*path*, *gcs_client*)
Bases: *luigi.target.AtomicLocalFile*

A GCS file that writes to a temp file and put to GCS on close.

move_to_final_destination ()

class `luigi.contrib.gcs.`**GCSTarget** (*path*, *format=None*, *client=None*)
Bases: *luigi.target.FileSystemTarget*

fs = None

open (*mode='r'*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters **`mode`** (*str*) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

class `luigi.contrib.gcs.`**`GCSFlagTarget`**(*path*, *format=None*, *client=None*, *flag='_SUCCESS'*)

Bases: *`luigi.contrib.gcs.GCSTarget`*

Defines a target directory with a flag-file (defaults to *_SUCCESS*) used to signify job success.

This checks for two things:

- the path exists (just like the GCSTarget)
- the _SUCCESS file exists within the directory.

Because Hadoop outputs into a directory and not a single file, the path is assumed to be a directory.

This is meant to be a handy alternative to AtomicGCSFile.

The AtomicFile approach can be burdensome for GCS since there are no directories, per se.

If we have 1,000,000 output files, then we have to rename 1,000,000 objects.

Initializes a GCSFlagTarget.

Parameters

- **`path`** (*str*) – the directory where the files are stored.
- **`client`** –
- **`flag`** (*str*) –

`fs = None`

`exists`()

Returns `True` if the path for this FileSystemTarget exists; `False` otherwise.

This method is implemented by using *`fs`*.

luigi.contrib.hadoop module

Run Hadoop Mapreduce jobs using Hadoop Streaming. To run a job, you need to subclass *`luigi.contrib.hadoop.JobTask`* and implement a `mapper` and `reducer` methods. See *Example – Top Artists* for an example of how to run a Hadoop job.

class `luigi.contrib.hadoop.`**`hadoop`**(**args*, ***kwargs*)

Bases: *`luigi.task.Config`*

`pool = OptionalParameter (defaults to None): Hadoop pool so use for Hadoop tasks. To`

`luigi.contrib.hadoop.`**`attach`**(**packages*)

Attach a python package to hadoop map reduce tarballs to make those packages available on the hadoop cluster.

`luigi.contrib.hadoop.`**`dereference`**(*f*)

`luigi.contrib.hadoop.`**`get_extra_files`**(*extra_files*)

`luigi.contrib.hadoop.`**`create_packages_archive`**(*packages*, *filename*)

Create a tar archive which will contain the files for the packages listed in packages.

`luigi.contrib.hadoop.`**`flatten`**`(`*sequence*`)`

A simple generator which flattens a sequence.

Only one level is flattened.

```
(1, (2, 3), 4) -> (1, 2, 3, 4)
```

`class` `luigi.contrib.hadoop.`**`HadoopRunContext`**

Bases: `object`

`kill_job``(`*captured_signal=None*, *stack_frame=None*`)`

`exception` `luigi.contrib.hadoop.`**`HadoopJobError`**`(`*message*, *out=None*, *err=None*`)`

Bases: `exceptions.RuntimeError`

`luigi.contrib.hadoop.`**`run_and_track_hadoop_job`**`(`*arglist*, *tracking_url_callback=None*, *env=None*`)`

Runs the job by invoking the command from the given arglist. Finds tracking urls from the output and attempts to fetch errors using those urls if the job fails. Throws HadoopJobError with information about the error (including stdout and stderr from the process) on failure and returns normally otherwise.

Parameters

- **`arglist`** –
- **`tracking_url_callback`** –
- **`env`** –

Returns

`luigi.contrib.hadoop.`**`fetch_task_failures`**`(`*tracking_url*`)`

Uses mechanize to fetch the actual task logs from the task tracker.

This is highly opportunistic, and we might not succeed. So we set a low timeout and hope it works. If it does not, it's not the end of the world.

TODO: Yarn has a REST API that we should probably use instead: http://hadoop.apache.org/docs/current/hadoop-yarn/hadoop-yarn-site/WebServicesIntro.html

`class` `luigi.contrib.hadoop.`**`JobRunner`**

Bases: `object`

`run_job = NotImplemented`

`class` `luigi.contrib.hadoop.`**`HadoopJobRunner`**`(`*streaming_jar*, *modules=None*, *streaming_args=None*, *libjars=None*, *libjars_in_hdfs=None*, *jobconfs=None*, *input_format=None*, *output_format=None*, *end_job_with_atomic_move_dir=True*, *archives=None*`)`

Bases: *`luigi.contrib.hadoop.JobRunner`*

Takes care of uploading & executing a Hadoop job using Hadoop streaming.

TODO: add code to support Elastic Mapreduce (using boto) and local execution.

`run_job``(`*job*, *tracking_url_callback=None*`)`

`finish``()`

`class` `luigi.contrib.hadoop.`**`DefaultHadoopJobRunner`**

Bases: *`luigi.contrib.hadoop.HadoopJobRunner`*

The default job runner just reads from config and sets stuff.

class luigi.contrib.hadoop.**LocalJobRunner**(*samplelines=None*)

Bases: *luigi.contrib.hadoop.JobRunner*

Will run the job locally.

This is useful for debugging and also unit testing. Tries to mimic Hadoop Streaming.

TODO: integrate with JobTask

sample(*input_stream*, *n*, *output*)

group(*input_stream*)

run_job(*job*)

class luigi.contrib.hadoop.**BaseHadoopJobTask**(**args*, ***kwargs*)

Bases: *luigi.task.Task*

pool = Insignificant OptionalParameter (defaults to None)

batch_counter_default = 1

final_mapper = NotImplemented

final_combiner = NotImplemented

final_reducer = NotImplemented

mr_priority = NotImplemented

package_binary = None

task_id = None

job_runner()

jobconfs()

init_local()

Implement any work to setup any internal datastructure etc here.

You can add extra input using the requires_local/input_local methods.

Anything you set on the object will be pickled and available on the Hadoop nodes.

init_hadoop()

data_interchange_format = 'python'

run()

The task run method, to be overridden in a subclass.

See *Task.run*

requires_local()

Default impl - override this method if you need any local input to be accessible in init().

requires_hadoop()

input_local()

input_hadoop()

deps()

Internal method used by the scheduler.

Returns the flattened list of requires.

on_failure(*exception*)
Override for custom error handling.

This method gets called if an exception is raised in `run()`. The returned value of this method is json encoded and sent to the scheduler as the *expl* argument. Its string representation will be used as the body of the error email sent out if any.

Default behavior is to return a string representation of the stack trace.

class luigi.contrib.hadoop.**JobTask**(**args*, ***kwargs*)
Bases: `luigi.contrib.hadoop.BaseHadoopJobTask`

jobconf_truncate = 20000

n_reduce_tasks = 25

reducer = NotImplemented

jobconfs()

init_mapper()

init_combiner()

init_reducer()

job_runner()
Get the MapReduce runner for this job.

If all outputs are HdfsTargets, the DefaultHadoopJobRunner will be used. Otherwise, the LocalJobRunner which streams all data through the local machine will be used (great for testing).

reader(*input_stream*)
Reader is a method which iterates over input lines and outputs records.

The default implementation yields one argument containing the line for each line in the input.

writer(*outputs*, *stdout*, *stderr=<open file '<stderr>', mode 'w'>*)
Writer format is a method which iterates over the output records from the reducer and formats them for output.

The default implementation outputs tab separated items.

mapper(*item*)
Re-define to process an input item (usually a line of input data).

Defaults to identity mapper that sends all lines to the same reducer.

combiner = NotImplemented

incr_counter(**args*, ***kwargs*)
Increments a Hadoop counter.

Since counters can be a bit slow to update, this batches the updates.

extra_modules()

extra_files()
Can be overriden in subclass.

Each element is either a string, or a pair of two strings (src, dst).

- *src* can be a directory (in which case everything will be copied recursively).
- *dst* can include subdirectories (foo/bar/baz.txt etc)

Uses Hadoop's -files option so that the same file is reused across tasks.

extra_streaming_arguments()
Extra arguments to Hadoop command line. Return here a list of (parameter, value) tuples.

extra_archives()
List of paths to archives

add_link(*src*, *dst*)

dump(*directory=''*)
Dump instance to file.

run_mapper(*stdin=<open file '<stdin>', mode 'r'>*, *stdout=<open file '<stdout>', mode 'w'>*)
Run the mapper on the hadoop node.

run_reducer(*stdin=<open file '<stdin>', mode 'r'>*, *stdout=<open file '<stdout>', mode 'w'>*)
Run the reducer on the hadoop node.

run_combiner(*stdin=<open file '<stdin>', mode 'r'>*, *stdout=<open file '<stdout>', mode 'w'>*)

internal_reader(*input_stream*)
Reader which uses python eval on each part of a tab separated string. Yields a tuple of python objects.

internal_writer(*outputs*, *stdout*)
Writer which outputs the python repr for each item.

luigi.contrib.hadoop_jar module

Provides functionality to run a Hadoop job using a Jar

luigi.contrib.hadoop_jar.**fix_paths**(*job*)
Coerce input arguments to use temporary files when used for output.

Return a list of temporary file pairs (tmpfile, destination path) and a list of arguments.

Converts each HdfsTarget to a string for the path.

exception luigi.contrib.hadoop_jar.**HadoopJarJobError**
Bases: exceptions.Exception

class luigi.contrib.hadoop_jar.**HadoopJarJobRunner**
Bases: *luigi.contrib.hadoop.JobRunner*

JobRunner for *hadoop jar* commands. Used to run a HadoopJarJobTask.

run_job(*job*, *tracking_url_callback=None*)

class luigi.contrib.hadoop_jar.**HadoopJarJobTask**(**args*, ***kwargs*)
Bases: *luigi.contrib.hadoop.BaseHadoopJobTask*

A job task for *hadoop jar* commands that define a jar and (optional) main method.

jar()
Path to the jar for this Hadoop Job.

main()
optional main method for this Hadoop Job.

job_runner()

atomic_output()
If True, then rewrite output arguments to be temp locations and atomically move them into place after the job finishes.

ssh()
Set this to run hadoop command remotely via ssh. It needs to be a dict that looks like {"host": "myhost", "key_file": None, "username": None, ["no_host_key_check": False]}

args()
Returns an array of args to pass to the job (after hadoop jar <jar> <main>).

luigi.contrib.hive module

exception luigi.contrib.hive.**HiveCommandError**(*message*, *out=None*, *err=None*)
Bases: exceptions.RuntimeError

luigi.contrib.hive.**load_hive_cmd**()

luigi.contrib.hive.**get_hive_syntax**()

luigi.contrib.hive.**get_hive_warehouse_location**()

luigi.contrib.hive.**get_ignored_file_masks**()

luigi.contrib.hive.**run_hive**(*args*, *check_return_code=True*)
Runs the *hive* from the command line, passing in the given args, and returning stdout.

With the apache release of Hive, so of the table existence checks (which are done using DESCRIBE do not exit with a return code of 0 so we need an option to ignore the return code and just return stdout for parsing

luigi.contrib.hive.**run_hive_cmd**(*hivecmd*, *check_return_code=True*)
Runs the given hive query and returns stdout.

luigi.contrib.hive.**run_hive_script**(*script*)
Runs the contents of the given script in hive and returns stdout.

class luigi.contrib.hive.**HiveClient**
Bases: object

table_location(*table*, *database='default'*, *partition=None*)
Returns location of db.table (or db.table.partition). partition is a dict of partition key to value.

table_schema(*table*, *database='default'*)
Returns list of [(name, type)] for each column in database.table.

table_exists(*table*, *database='default'*, *partition=None*)
Returns true if db.table (or db.table.partition) exists. partition is a dict of partition key to value.

partition_spec(*partition*)
Turn a dict into a string partition specification

class luigi.contrib.hive.**HiveCommandClient**
Bases: *luigi.contrib.hive.HiveClient*

Uses *hive* invocations to find information.

table_location(*table*, *database='default'*, *partition=None*)
Returns location of db.table (or db.table.partition). partition is a dict of partition key to value.

table_exists(*table*, *database='default'*, *partition=None*)
Returns true if db.table (or db.table.partition) exists. partition is a dict of partition key to value.

table_schema(*table*, *database='default'*)
Returns list of [(name, type)] for each column in database.table.

partition_spec(*partition*)
Turns a dict into the a Hive partition specification string.

class luigi.contrib.hive.**ApacheHiveCommandClient**
Bases: *luigi.contrib.hive.HiveCommandClient*

A subclass for the HiveCommandClient to (in some cases) ignore the return code from the hive command so that we can just parse the output.

table_schema(*table*, *database='default'*)
Returns list of [(name, type)] for each column in database.table.

class luigi.contrib.hive.**MetastoreClient**
Bases: *luigi.contrib.hive.HiveClient*

table_location(*table*, *database='default'*, *partition=None*)
Returns location of db.table (or db.table.partition). partition is a dict of partition key to value.

table_exists(*table*, *database='default'*, *partition=None*)
Returns true if db.table (or db.table.partition) exists. partition is a dict of partition key to value.

table_schema(*table*, *database='default'*)
Returns list of [(name, type)] for each column in database.table.

partition_spec(*partition*)
Turn a dict into a string partition specification

class luigi.contrib.hive.**HiveThriftContext**
Bases: object

Context manager for hive metastore client.

class luigi.contrib.hive.**WarehouseHiveClient**(*hdfs_client=None*, *warehouse_location=None*)
Bases: *luigi.contrib.hive.HiveClient*

Client for managed tables that makes decision based on presence of directory in hdfs

table_schema(*table*, *database='default'*)
Returns list of [(name, type)] for each column in database.table.

table_location(*table*, *database='default'*, *partition=None*)
Returns location of db.table (or db.table.partition). partition is a dict of partition key to value.

table_exists(*table*, *database='default'*, *partition=None*)
The table/partition is considered existing if corresponding path in hdfs exists and contains file except those which match pattern set in *ignored_file_masks*

partition_spec(*partition*)
Turn a dict into a string partition specification

luigi.contrib.hive.**get_default_client**()

class luigi.contrib.hive.**HiveQueryTask**(**args*, ***kwargs*)
Bases: *luigi.contrib.hadoop.BaseHadoopJobTask*

Task to run a hive query.

n_reduce_tasks = None

bytes_per_reducer = None

reducers_max = None

query()
Text of query to run in hive

hiverc()

Location of an rc file to run before the query if hiverc-location key is specified in luigi.cfg, will default to the value there otherwise returns None.

Returning a list of rc files will load all of them in order.

hivevars()

Returns a dict of key=value settings to be passed along to the hive command line via –hivevar. This option can be used as a separated namespace for script local variables. See https://cwiki.apache.org/confluence/display/Hive/LanguageManual+VariableSubstitution

hiveconfs()

Returns a dict of key=value settings to be passed along to the hive command line via –hiveconf. By default, sets mapred.job.name to task_id and if not None, sets:

- mapred.reduce.tasks (n_reduce_tasks)
- mapred.fairscheduler.pool (pool) or mapred.job.queue.name (pool)
- hive.exec.reducers.bytes.per.reducer (bytes_per_reducer)
- hive.exec.reducers.max (reducers_max)

job_runner()

class luigi.contrib.hive.**HiveQueryRunner**

Bases: *luigi.contrib.hadoop.JobRunner*

Runs a HiveQueryTask by shelling out to hive.

prepare_outputs(*job*)

Called before job is started.

If output is a *FileSystemTarget*, create parent directories so the hive command won't fail

get_arglist(*f_name*, *job*)

run_job(*job*, *tracking_url_callback=None*)

class luigi.contrib.hive.**HivePartitionTarget**(*table*, *partition*, *database='default'*, *fail_missing_table=True*, *client=None*)

Bases: *luigi.target.Target*

Target representing Hive table or Hive partition

@param table: Table name @type table: str @param partition: partition specificaton in form of dict of {"partition_column_1": "partition_value_1", "partition_column_2": "partition_value_2", … } If *partition* is *None* or *{}* then target is Hive nonpartitioned table @param database: Database name @param fail_missing_table: flag to ignore errors raised due to table nonexistence @param client: *HiveCommandClient* instance. Default if *client is None*

exists()

returns *True* if the partition/table exists

path

Returns the path for this HiveTablePartitionTarget's data.

class luigi.contrib.hive.**HiveTableTarget**(*table*, *database='default'*, *client=None*)

Bases: *luigi.contrib.hive.HivePartitionTarget*

Target representing non-partitioned table

class luigi.contrib.hive.**ExternalHiveTask**(**args*, ***kwargs*)

Bases: *luigi.task.ExternalTask*

External task that depends on a Hive table/partition.

database = Parameter (defaults to default)

table = Parameter

partition = DictParameter (defaults to {}): Python dictionary specifying the target pa

output()

The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

luigi.contrib.kubernetes module

Kubernetes Job wrapper for Luigi.

From the Kubernetes website:

> Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.

For more information about Kubernetes Jobs: http://kubernetes.io/docs/user-guide/jobs/

Requires:

- pykube: `pip install pykube-ng`

Written and maintained by Marco Capuccini (@mcapuccini).

class luigi.contrib.kubernetes.**kubernetes**(**args*, ***kwargs*)

Bases: `luigi.task.Config`

auth_method = Parameter (defaults to kubeconfig): Authorization method to access the c

kubeconfig_path = Parameter (defaults to ~/.kube/config): Path to kubeconfig file for

max_retrials = IntParameter (defaults to 0): Max retrials in event of job failure

kubernetes_namespace = OptionalParameter (defaults to None): K8s namespace in which th

class luigi.contrib.kubernetes.**KubernetesJobTask**(**args*, ***kwargs*)

Bases: `luigi.task.Task`

auth_method

This can be set to `kubeconfig` or `service-account`. It defaults to `kubeconfig`.

For more details, please refer to:

- kubeconfig: http://kubernetes.io/docs/user-guide/kubeconfig-file
- service-account: http://kubernetes.io/docs/user-guide/service-accounts

kubeconfig_path

Path to kubeconfig file used for cluster authentication. It defaults to "~/.kube/config", which is the default location when using minikube (http://kubernetes.io/docs/getting-started-guides/minikube). When auth_method is `service-account` this property is ignored.

WARNING: For Python versions < 3.5 kubeconfig must point to a Kubernetes API hostname, and NOT to an IP address.

For more details, please refer to: http://kubernetes.io/docs/user-guide/kubeconfig-file

kubernetes_namespace
Namespace in Kubernetes where the job will run. It defaults to the default namespace in Kubernetes

For more details, please refer to: https://kubernetes.io/docs/concepts/overview/working-with-objects/namespaces/

name
A name for this job. This task will automatically append a UUID to the name before to submit to Kubernetes.

labels
Return custom labels for kubernetes job. example:: `{"run_dt": datetime.date.today().strftime('%F')}`

spec_schema
Kubernetes Job spec schema in JSON format, an example follows.

```
{
    "containers": [{
        "name": "pi",
        "image": "perl",
        "command": ["perl",  "-Mbignum=bpi", "-wle", "print bpi(2000)"]
    }],
    "restartPolicy": "Never"
}
```

restartPolicy

- If restartPolicy is not defined, it will be set to “Never” by default.
- **Warning**: restartPolicy=OnFailure will bypass max_retrials, and restart the container until success, with the risk of blocking the Luigi task.

For more informations please refer to: http://kubernetes.io/docs/user-guide/pods/multi-container/#the-spec-schema

max_retrials
Maximum number of retrials in case of failure.

backoff_limit
Maximum number of retries before considering the job as failed. See: https://kubernetes.io/docs/concepts/workloads/controllers/jobs-run-to-completion/#pod-backoff-failure-policy

delete_on_success
Delete the Kubernetes workload if the job has ended successfully.

print_pod_logs_on_exit
Fetch and print the pod logs once the job is completed.

active_deadline_seconds
Time allowed to successfully schedule pods. See: https://kubernetes.io/docs/concepts/workloads/controllers/jobs-run-to-completion/#job-termination-and-cleanup

kubernetes_config

poll_interval
How often to poll Kubernetes for job status, in seconds.

pod_creation_wait_interal
Delay for initial pod creation for just submitted job in seconds

signal_complete()

Signal job completion for scheduler and dependent tasks.

Touching a system file is an easy way to signal completion. example:: .. code-block:: python

with self.output().open('w') as output_file: output_file.write('')

run()

The task run method, to be overridden in a subclass.

See *Task.run*

output()

An output target is necessary for checking job completion unless an alternative complete method is defined.

Example:

```
return luigi.LocalTarget(os.path.join('/tmp', 'example'))
```

luigi.contrib.lsf module

luigi.contrib.lsf.**track_job**(*job_id*)

Tracking is done by requesting each job and then searching for whether the job has one of the following states: - "RUN", - "PEND", - "SSUSP", - "EXIT" based on the LSF documentation

luigi.contrib.lsf.**kill_job**(*job_id*)

Kill a running LSF job

class luigi.contrib.lsf.**LSFJobTask**(**args*, ***kwargs*)

Bases: *luigi.task.Task*

Takes care of uploading and executing an LSF job

n_cpu_flag = Insignificant IntParameter (defaults to 2)

shared_tmp_dir = Insignificant Parameter (defaults to /tmp)

resource_flag = Insignificant Parameter (defaults to mem=8192)

memory_flag = Insignificant Parameter (defaults to 8192)

queue_flag = Insignificant Parameter (defaults to queue_name)

runtime_flag = IntParameter (defaults to 60)

job_name_flag = Parameter (defaults to)

poll_time = Insignificant FloatParameter (defaults to 5): specify the wait time to po

save_job_info = BoolParameter (defaults to False)

output = Parameter (defaults to)

extra_bsub_args = Parameter (defaults to)

job_status = None

fetch_task_failures()

Read in the error file from bsub

fetch_task_output()

Read in the output file

init_local()
Implement any work to setup any internal datastructure etc here. You can add extra input using the requires_local/input_local methods. Anything you set on the object will be pickled and available on the compute nodes.

run()
The procedure: - Pickle the class - Tarball the dependencies - Construct a bsub argument that runs a generic runner function with the path to the pickled class - Runner function loads the class from pickle - Runner class untars the dependencies - Runner function hits the button on the class's work() method

work()
Subclass this for where you're doing your actual work.

Why not run(), like other tasks? Because we need run to always be something that the Worker can call, and that's the real logical place to do LSF scheduling. So, the work will happen in work().

class luigi.contrib.lsf.**LocalLSFJobTask**(**args*, ***kwargs*)
Bases: *luigi.contrib.lsf.LSFJobTask*

A local version of JobTask, for easier debugging.

run()
The procedure: - Pickle the class - Tarball the dependencies - Construct a bsub argument that runs a generic runner function with the path to the pickled class - Runner function loads the class from pickle - Runner class untars the dependencies - Runner function hits the button on the class's work() method

luigi.contrib.lsf_runner module

luigi.contrib.lsf_runner.**do_work_on_compute_node**(*work_dir*)

luigi.contrib.lsf_runner.**extract_packages_archive**(*work_dir*)

luigi.contrib.lsf_runner.**main**(*args=['/home/docs/checkouts/readthedocs.org/user_builds/luigi/envs/latest/bin/sphinx-build', '-b', 'latex', '-D', 'language=en', '-d', '_build/doctrees', '.', '_build/latex']*)
Run the work() method from the class instance in the file "job-instance.pickle".

luigi.contrib.mongodb module

class luigi.contrib.mongodb.**MongoTarget**(*mongo_client*, *index*, *collection*)
Bases: *luigi.target.Target*

Target for a resource in MongoDB

Parameters

- **mongo_client** (*MongoClient*) – MongoClient instance
- **index** (*str*) – database index
- **collection** (*str*) – index collection

get_collection()
Return targeted mongo collection to query on

get_index()
Return targeted mongo index to query on

class luigi.contrib.mongodb.**MongoCellTarget**(*mongo_client*, *index*, *collection*, *document_id*, *path*)

Bases: *luigi.contrib.mongodb.MongoTarget*

Target for a ressource in a specific field from a MongoDB document

Parameters

- **document_id** (*str*) – targeted mongo document
- **path** (*str*) – full path to the targeted field in the mongo document

exists()

Test if target has been run Target is considered run if the targeted field exists

read()

Read the target value Use $project aggregate operator in order to support nested objects

write(*value*)

Write value to the target

class luigi.contrib.mongodb.**MongoRangeTarget**(*mongo_client*, *index*, *collection*, *document_ids*, *field*)

Bases: *luigi.contrib.mongodb.MongoTarget*

Target for a level 0 field in a range of documents

Parameters

- **document_ids** – targeted mongo documents
- **field** (*str*) – targeted field in documents

exists()

Test if target has been run Target is considered run if the targeted field exists in ALL documents

read()

Read the targets value

write(*values*)

Write values to the targeted documents Values need to be a dict as : {document_id: value}

get_empty_ids()

Get documents id with missing targeted field

class luigi.contrib.mongodb.**MongoCollectionTarget**(*mongo_client*, *index*, *collection*)

Bases: *luigi.contrib.mongodb.MongoTarget*

Target for existing collection

exists()

Test if target has been run Target is considered run if the targeted collection exists in the database

read()

Return if the target collection exists in the database

class luigi.contrib.mongodb.**MongoCountTarget**(*mongo_client*, *index*, *collection*, *target_count*)

Bases: *luigi.contrib.mongodb.MongoTarget*

Target for documents count

Parameters **target_count** – Value of the desired item count in the target

exists()
Test if the target has been run Target is considered run if the number of items in the target matches value of self._target_count

read()
Using the aggregate method to avoid inaccurate count if using a sharded cluster https://docs.mongodb.com/manual/reference/method/db.collection.count/#behavior

luigi.contrib.mrrunner module

Since after Luigi 2.5.0, this is a private module to Luigi. Luigi users should not rely on that importing this module works. Furthermore, "luigi mr streaming" have been greatly superseeded by technoligies like Spark, Hive, etc.

The hadoop runner.

This module contains the main() method which will be used to run the mapper, combiner, or reducer on the Hadoop nodes.

class luigi.contrib.mrrunner.**Runner**(*job=None*)
Bases: object

Run the mapper, combiner, or reducer on hadoop nodes.

run(*kind*, *stdin=<open file '<stdin>', mode 'r'>*, *stdout=<open file '<stdout>', mode 'w'>*)

extract_packages_archive()

luigi.contrib.mrrunner.**print_exception**(*exc*)

luigi.contrib.mrrunner.**main**(*args=None*, *stdin=<open file '<stdin>', mode 'r'>*, *stdout=<open file '<stdout>', mode 'w'>*, *print_exception=<function print_exception>*)
Run either the mapper, combiner, or reducer from the class instance in the file "job-instance.pickle".

Arguments:

kind – is either map, combiner, or reduce

luigi.contrib.mssqldb module

class luigi.contrib.mssqldb.**MSSqlTarget**(*host*, *database*, *user*, *password*, *table*, *update_id*)
Bases: *luigi.target.Target*

Target for a resource in Microsoft SQL Server. This module is primarily derived from mysqldb.py. Much of MSSqlTarget, MySqlTarget and PostgresTarget are similar enough to potentially add a RDBMSTarget abstract base class to rdbms.py that these classes could be derived from.

Initializes a MsSqlTarget instance.

Parameters

- **host** (*str*) – MsSql server address. Possibly a host:port string.
- **database** (*str*) – database name.
- **user** (*str*) – database user
- **password** (*str*) – password for specified user.
- **update_id** (*str*) – an identifier for this data set.

marker_table = 'table_updates'

touch(*connection=None*)
Mark this update as complete.

IMPORTANT, If the marker table doesn't exist, the connection transaction will be aborted and the connection reset. Then the marker table will be created.

exists(*connection=None*)
Returns `True` if the `Target` exists and `False` otherwise.

connect()
Create a SQL Server connection and return a connection object

create_marker_table()
Create marker table if it doesn't exist. Use a separate connection since the transaction might have to be reset.

luigi.contrib.mysqldb module

class luigi.contrib.mysqldb.**MySqlTarget**(*host*, *database*, *user*, *password*, *table*, *update_id*, ***cnx_kwargs*)
Bases: *luigi.target.Target*

Target for a resource in MySql.

Initializes a MySqlTarget instance.

Parameters

- **host** (*str*) – MySql server address. Possibly a host:port string.
- **database** (*str*) – database name.
- **user** (*str*) – database user
- **password** (*str*) – password for specified user.
- **update_id** (*str*) – an identifier for this data set.
- **cnx_kwargs** – optional params for mysql connector constructor. See https://dev.mysql.com/doc/connector-python/en/connector-python-connectargs.html.

marker_table = 'table_updates'

touch(*connection=None*)
Mark this update as complete.

IMPORTANT, If the marker table doesn't exist, the connection transaction will be aborted and the connection reset. Then the marker table will be created.

exists(*connection=None*)
Returns `True` if the `Target` exists and `False` otherwise.

connect(*autocommit=False*)

create_marker_table()
Create marker table if it doesn't exist.

Using a separate connection since the transaction might have to be reset.

class luigi.contrib.mysqldb.**CopyToTable**(**args*, ***kwargs*)
Bases: *luigi.contrib.rdbms.CopyToTable*

Template task for inserting a data set into MySQL

Usage: Subclass and override the required *host*, *database*, *user*, *password*, *table* and *columns* attributes.

To customize how to access data from an input task, override the *rows* method with a generator that yields each row as a tuple with fields ordered according to *columns*.

rows()
Return/yield tuples or lists corresponding to each row to be inserted.

output()
Returns a MySqlTarget representing the inserted dataset.

Normally you don't override this.

copy(*cursor*, *file=None*)

run()
Inserts data generated by rows() into target table.

If the target table doesn't exist, self.create_table will be called to attempt to create the table.

Normally you don't want to override this.

bulk_size

luigi.contrib.opener module

OpenerTarget support, allows easier testing and configuration by abstracting out the LocalTarget, S3Target, and MockTarget types.

Example:

```
from luigi.contrib.opener import OpenerTarget

OpenerTarget('/local/path.txt')
OpenerTarget('s3://zefr/remote/path.txt')
```

exception luigi.contrib.opener.**OpenerError**
Bases: *luigi.target.FileSystemException*

The base exception thrown by openers

exception luigi.contrib.opener.**NoOpenerError**
Bases: *luigi.contrib.opener.OpenerError*

Thrown when there is no opener for the given protocol

exception luigi.contrib.opener.**InvalidQuery**
Bases: *luigi.contrib.opener.OpenerError*

Thrown when an opener is passed unexpected arguments

class luigi.contrib.opener.**OpenerRegistry**(*openers=None*)
Bases: object

An opener registry that stores a number of opener objects used to parse Target URIs

Parameters **openers** (*list*) – A list of objects inherited from the Opener class.

get_opener(*name*)
Retrieve an opener for the given protocol

Parameters **name** (*string*) – name of the opener to open

Raises ***NoOpenerError*** – if no opener has been registered of that name

add(*opener*)
Adds an opener to the registry

Parameters **opener** (*Opener inherited object*) – Opener object

open(*target_uri*, ***kwargs*)
Open target uri.

Parameters **target_uri** (*string*) – Uri to open

Returns Target object

class luigi.contrib.opener.**Opener**
Bases: `object`

Base class for Opener objects.

allowed_kwargs = {}

filter_kwargs = True

classmethod conform_query(*query*)
Converts the query string from a target uri, uses cls.allowed_kwargs, and cls.filter_kwargs to drive logic.

Parameters **query** (*urllib.parse.unsplit(uri) query*) – Unparsed query string

Returns Dictionary of parsed values, everything in cls.allowed_kwargs with values set to True will be parsed as json strings.

classmethod get_target(*scheme*, *path*, *fragment*, *username*, *password*, *hostname*, *port*, *query*, ***kwargs*)
Override this method to use values from the parsed uri to initialize the expected target.

class luigi.contrib.opener.**MockOpener**
Bases: *luigi.contrib.opener.Opener*

Mock target opener, works like LocalTarget but files are all in memory.

example: * mock://foo/bar.txt

names = ['mock']

allowed_kwargs = {'format': False, 'is_tmp': True, 'mirror_on_stderr': True}

classmethod get_target(*scheme*, *path*, *fragment*, *username*, *password*, *hostname*, *port*, *query*, ***kwargs*)
Override this method to use values from the parsed uri to initialize the expected target.

class luigi.contrib.opener.**LocalOpener**
Bases: *luigi.contrib.opener.Opener*

Local filesystem opener, works with any valid system path. This is the default opener and will be used if you don't indicate which opener.

examples: * file://relative/foo/bar/baz.txt (opens a relative file) * file:///home/user (opens a directory from a absolute path) * foo/bar.baz (file:// is the default opener)

names = ['file']

allowed_kwargs = {'format': False, 'is_tmp': True}

classmethod get_target(*scheme*, *path*, *fragment*, *username*, *password*, *hostname*, *port*, *query*, ***kwargs*)
Override this method to use values from the parsed uri to initialize the expected target.

class luigi.contrib.opener.**S3Opener**

Bases: *luigi.contrib.opener.Opener*

Opens a target stored on Amazon S3 storage

examples: * s3://bucket/foo/bar.txt * s3://bucket/foo/bar.txt?aws_access_key_id=xxx&aws_secret_access_key=yyy

names = ['s3', 's3n']

allowed_kwargs = {'client': True, 'format': False}

filter_kwargs = False

classmethod get_target(*scheme*, *path*, *fragment*, *username*, *password*, *hostname*, *port*, *query*, ***kwargs*)

Override this method to use values from the parsed uri to initialize the expected target.

luigi.contrib.pai module

MicroSoft OpenPAI Job wrapper for Luigi.

> "OpenPAI is an open source platform that provides complete AI model training and resource management capabilities, it is easy to extend and supports on-premise, cloud and hybrid environments in various scale."

For more information about OpenPAI : https://github.com/Microsoft/pai/, this task is tested against OpenPAI 0.7.1

Requires:

- requests: `pip install requests`

Written and maintained by Liu, Dongqing (@liudongqing).

luigi.contrib.pai.**slot_to_dict**(*o*)

class luigi.contrib.pai.**PaiJob**(*jobName*, *image*, *tasks*)

Bases: `object`

The Open PAI job definition. Refer to here https://github.com/Microsoft/pai/blob/master/docs/job_tutorial.md

```
{
  "jobName":   String,
  "image":     String,
  "authFile":  String,
  "dataDir":   String,
  "outputDir": String,
  "codeDir":   String,
  "virtualCluster": String,
  "taskRoles": [
    {
      "name":       String,
      "taskNumber": Integer,
      "cpuNumber":  Integer,
      "memoryMB":   Integer,
      "shmMB":      Integer,
      "gpuNumber":  Integer,
      "portList": [
        {
          "label": String,
          "beginAt": Integer,
          "portNumber": Integer
```

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```
        }
      ],
      "command":    String,
      "minFailedTaskCount": Integer,
      "minSucceededTaskCount": Integer
    }
  ],
  "gpuType": String,
  "retryCount": Integer
}
```

Initialize a Job with required fields.

Parameters

- **`jobName`** – Name for the job, need to be unique
- **`image`** – URL pointing to the Docker image for all tasks in the job
- **`tasks`** – List of taskRole, one task role at least

`jobName`

`image`

`taskRoles`

`authFile`

`codeDir`

`dataDir`

`gpuType`

`outputDir`

`retryCount`

`virtualCluster`

class `luigi.contrib.pai.`**`Port`**(*label*, *begin_at=0*, *port_number=1*)

Bases: `object`

The Port definition for TaskRole

Parameters

- **`label`** – Label name for the port type, required
- **`begin_at`** – The port to begin with in the port type, 0 for random selection, required
- **`port_number`** – Number of ports for the specific type, required

`label`

`beginAt`

`portNumber`

class `luigi.contrib.pai.`**`TaskRole`**(*name*, *command*, *taskNumber=1*, *cpuNumber=1*, *memoryMB=2048*, *shmMB=64*, *gpuNumber=0*, *portList=[]*)

Bases: `object`

The TaskRole of PAI

Parameters

- **name** – Name for the task role, need to be unique with other roles, required
- **command** – Executable command for tasks in the task role, can not be empty, required
- **taskNumber** – Number of tasks for the task role, no less than 1, required
- **cpuNumber** – CPU number for one task in the task role, no less than 1, required
- **shmMB** – Shared memory for one task in the task role, no more than memory size, required
- **memoryMB** – Memory for one task in the task role, no less than 100, required
- **gpuNumber** – GPU number for one task in the task role, no less than 0, required
- **portList** – List of portType to use, optional

name

command

taskNumber

cpuNumber

memoryMB

shmMB

gpuNumber

portList

minFailedTaskCount

minSucceededTaskCount

class luigi.contrib.pai.**OpenPai**(**args*, ***kwargs*)
Bases: *luigi.task.Config*

pai_url = Parameter (defaults to http://127.0.0.1:9186): rest server url, default is

username = Parameter (defaults to admin): your username

password = Parameter (defaults to None): your password

expiration = IntParameter (defaults to 3600): expiration time in seconds

class luigi.contrib.pai.**PaiTask**(**args*, ***kwargs*)
Bases: *luigi.task.Task*

Parameters

- **pai_url** – The rest server url of PAI clusters, default is 'http://127.0.0.1:9186'.
- **token** – The token used to auth the rest server of PAI.

name
Name for the job, need to be unique, required

image
URL pointing to the Docker image for all tasks in the job, required

tasks
List of taskRole, one task role at least, required

auth_file_path
Docker registry authentication file existing on HDFS, optional

data_dir
Data directory existing on HDFS, optional

code_dir
Code directory existing on HDFS, should not contain any data and should be less than 200MB, optional

output_dir
Output directory on HDFS, $PAI_DEFAULT_FS_URI/$jobName/output will be used if not specified, optional

virtual_cluster
The virtual cluster job runs on. If omitted, the job will run on default virtual cluster, optional

gpu_type
Specify the GPU type to be used in the tasks. If omitted, the job will run on any gpu type, optional

retry_count
Job retry count, no less than 0, optional

run()
The task run method, to be overridden in a subclass.

See *Task.run*

output()
The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

complete()
If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

luigi.contrib.pig module

Apache Pig support. Example configuration section in luigi.cfg:

```
[pig]
# pig home directory
home: /usr/share/pig
```

class luigi.contrib.pig.**PigJobTask**(**args*, ***kwargs*)
Bases: *luigi.task.Task*

pig_home()

pig_command_path()

pig_env_vars()
Dictionary of environment variables that should be set when running Pig.

Ex:: return { 'PIG_CLASSPATH': '/your/path' }

pig_properties()
Dictionary of properties that should be set when running Pig.

Example:

```
return { 'pig.additional.jars':'/path/to/your/jar' }
```

pig_parameters()
Dictionary of parameters that should be set for the Pig job.

Example:

```
return { 'YOUR_PARAM_NAME':'Your param value' }
```

pig_options()
List of options that will be appended to the Pig command.

Example:

```
return ['-x', 'local']
```

output()
The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

pig_script_path()
Return the path to the Pig script to be run.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

track_and_progress(*cmd*)

class luigi.contrib.pig.**PigRunContext**
Bases: `object`

kill_job(*captured_signal=None*, *stack_frame=None*)

exception luigi.contrib.pig.**PigJobError**(*message*, *out=None*, *err=None*)
Bases: `exceptions.RuntimeError`

luigi.contrib.postgres module

Implements a subclass of *`Target`* that writes data to Postgres. Also provides a helper task to copy data into a Postgres table.

class luigi.contrib.postgres.**MultiReplacer**(*replace_pairs*)
Bases: `object`

Object for one-pass replace of multiple words

Substituted parts will not be matched against other replace patterns, as opposed to when using multipass replace. The order of the items in the replace_pairs input will dictate replacement precedence.

Constructor arguments: replace_pairs – list of 2-tuples which hold strings to be replaced and replace string

Usage:

```
>>> replace_pairs = [("a", "b"), ("b", "c")]
>>> MultiReplacer(replace_pairs)("abcd")
'bccd'
>>> replace_pairs = [("ab", "x"), ("a", "x")]
>>> MultiReplacer(replace_pairs)("ab")
'x'
>>> replace_pairs.reverse()
>>> MultiReplacer(replace_pairs)("ab")
'xb'
```

Initializes a MultiReplacer instance.

Parameters **replace_pairs** (*tuple*) – list of 2-tuples which hold strings to be replaced and replace string.

class luigi.contrib.postgres.**PostgresTarget**(*host*, *database*, *user*, *password*, *table*, *update_id*, *port=None*)

Bases: *luigi.target.Target*

Target for a resource in Postgres.

This will rarely have to be directly instantiated by the user.

Args: host (str): Postgres server address. Possibly a host:port string. database (str): Database name user (str): Database user password (str): Password for specified user update_id (str): An identifier for this data set port (int): Postgres server port.

marker_table = 'table_updates'

DEFAULT_DB_PORT = 5432

use_db_timestamps = True

touch(*connection=None*)

Mark this update as complete.

Important: If the marker table doesn't exist, the connection transaction will be aborted and the connection reset. Then the marker table will be created.

exists(*connection=None*)

Returns `True` if the `Target` exists and `False` otherwise.

connect()

Get a psycopg2 connection object to the database where the table is.

create_marker_table()

Create marker table if it doesn't exist.

Using a separate connection since the transaction might have to be reset.

open(*mode*)

class luigi.contrib.postgres.**CopyToTable**(**args*, ***kwargs*)

Bases: *luigi.contrib.rdbms.CopyToTable*

Template task for inserting a data set into Postgres

Usage: Subclass and override the required *host*, *database*, *user*, *password*, *table* and *columns* attributes.

To customize how to access data from an input task, override the *rows* method with a generator that yields each row as a tuple with fields ordered according to *columns*.

rows()
Return/yield tuples or lists corresponding to each row to be inserted.

map_column(*value*)
Applied to each column of every row returned by *rows*.

Default behaviour is to escape special characters and identify any self.null_values.

output()
Returns a PostgresTarget representing the inserted dataset.

Normally you don't override this.

copy(*cursor*, *file*)

run()
Inserts data generated by rows() into target table.

If the target table doesn't exist, self.create_table will be called to attempt to create the table.

Normally you don't want to override this.

class `luigi.contrib.postgres.`**PostgresQuery**(**args*, ***kwargs*)
Bases: *`luigi.contrib.rdbms.Query`*

Template task for querying a Postgres compatible database

Usage: Subclass and override the required *host*, *database*, *user*, *password*, *table*, and *query* attributes. Optionally one can override the *autocommit* attribute to put the connection for the query in autocommit mode.

Override the *run* method if your use case requires some action with the query result.

Task instances require a dynamic *update_id*, e.g. via parameter(s), otherwise the query will only execute once

To customize the query signature as recorded in the database marker table, override the *update_id* property.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

output()
Returns a PostgresTarget representing the executed query.

Normally you don't override this.

luigi.contrib.presto module

class `luigi.contrib.presto.`**presto**(**args*, ***kwargs*)
Bases: *`luigi.task.Config`*

host = Parameter (defaults to localhost): Presto host

port = IntParameter (defaults to 8090): Presto port

user = Parameter (defaults to anonymous): Presto user

catalog = Parameter (defaults to hive): Default catalog

password = Parameter (defaults to None): User password

protocol = Parameter (defaults to https): Presto connection protocol

poll_interval = FloatParameter (defaults to 1.0): how often to ask the Presto REST in

class luigi.contrib.presto.**PrestoClient**(*connection*, *sleep_time=1*)
Helper class wrapping *pyhive.presto.Connection* for executing presto queries and tracking progress

percentage_progress

Returns percentage of query overall progress

info_uri

Returns query UI link

execute(*query*, *parameters=None*, *mode=None*)

Parameters

- **query** – query to run
- **parameters** – parameters should be injected in the query
- **mode** – "fetch" - yields rows, "watch" - yields log entries

Returns

class luigi.contrib.presto.**WithPrestoClient**
Bases: *luigi.task_register.Register*

A metaclass for injecting *PrestoClient* as a *_client* field into a new instance of class *T* Presto connection options are taken from *T*-instance fields Fields should have the same names as in *pyhive.presto.Cursor*

class luigi.contrib.presto.**PrestoTarget**(*client*, *catalog*, *database*, *table*, *partition=None*)
Bases: *luigi.target.Target*

Target for presto-accessible tables

count()

exists()

Returns *True* if given table exists and there are any rows in a given partition *False* if no rows in the partition exists or table is absent

class luigi.contrib.presto.**PrestoTask**(**args*, ***kwargs*)
Bases: *luigi.contrib.rdbms.Query*

Task for executing presto queries During its executions tracking url and percentage progress are set

host

port

user

username

schema

password

catalog

poll_interval

source

partition

protocol

session_props

requests_session

requests_kwargs

query = None

run()

The task run method, to be overridden in a subclass.

See *Task.run*

output()

Override with an RDBMS Target (e.g. PostgresTarget or RedshiftTarget) to record execution in a marker table

luigi.contrib.prometheus_metric module

luigi.contrib.pyspark_runner module

The pyspark program.

This module will be run by spark-submit for PySparkTask jobs.

The first argument is a path to the pickled instance of the PySparkTask, other arguments are the ones returned by PySparkTask.app_options()

class luigi.contrib.pyspark_runner.**SparkContextEntryPoint**(*conf*)

Bases: `luigi.contrib.pyspark_runner._SparkEntryPoint`

sc = None

class luigi.contrib.pyspark_runner.**SparkSessionEntryPoint**(*conf*)

Bases: `luigi.contrib.pyspark_runner._SparkEntryPoint`

spark = None

class luigi.contrib.pyspark_runner.**AbstractPySparkRunner**(*job*, **args*)

Bases: `object`

run()

class luigi.contrib.pyspark_runner.**PySparkRunner**(*job*, **args*)

Bases: *luigi.contrib.pyspark_runner.AbstractPySparkRunner*

class luigi.contrib.pyspark_runner.**PySparkSessionRunner**(*job*, **args*)

Bases: *luigi.contrib.pyspark_runner.AbstractPySparkRunner*

luigi.contrib.rdbms module

A common module for postgres like databases, such as postgres or redshift

class luigi.contrib.rdbms.**CopyToTable**(**args*, ***kwargs*)

Bases: *luigi.task.MixinNaiveBulkComplete*, `luigi.contrib.rdbms._MetadataColumnsMixin`, *luigi.task.Task*

An abstract task for inserting a data set into RDBMS.

Usage:

Subclass and override the following attributes:

- *host*,
- *database*,
- *user*,
- *password*,
- *table*
- *columns*
- *port*

`host`

`database`

`user`

`password`

`table`

`port`

`columns = []`

`null_values = (None,)`

`column_separator = '\t'`

`create_table`(*connection*)

Override to provide code for creating the target table.

By default it will be created using types (optionally) specified in columns.

If overridden, use the provided connection object for setting up the table in order to create the table and insert data using the same transaction.

`update_id`

This update id will be a unique identifier for this insert on this table.

`output`()

The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

`init_copy`(*connection*)

Override to perform custom queries.

Any code here will be formed in the same transaction as the main copy, just prior to copying data. Example use cases include truncating the table or removing all data older than X in the database to keep a rolling window of data available in the table.

`post_copy`(*connection*)

Override to perform custom queries.

Any code here will be formed in the same transaction as the main copy, just after copying data. Example use cases include cleansing data in temp table prior to insertion into real table.

copy (*cursor*, *file*)

class luigi.contrib.rdbms.**Query** (**args*, ***kwargs*)

Bases: *luigi.task.MixinNaiveBulkComplete*, *luigi.task.Task*

An abstract task for executing an RDBMS query.

Usage:

Subclass and override the following attributes:

- *host*,
- *database*,
- *user*,
- *password*,
- *table*,
- *query*

Optionally override:

- *port*,
- *autocommit*
- *update_id*

Subclass and override the following methods:

- *run*
- *output*

host

Host of the RDBMS. Implementation should support *hostname:port* to encode port.

port

Override to specify port separately from host.

database

user

password

table

query

autocommit

update_id

Override to create a custom marker table 'update_id' signature for Query subclass task instances

run ()

The task run method, to be overridden in a subclass.

See *Task.run*

output ()

Override with an RDBMS Target (e.g. PostgresTarget or RedshiftTarget) to record execution in a marker table

luigi.contrib.redis_store module

class luigi.contrib.redis_store.**RedisTarget**(*host*, *port*, *db*, *update_id*, *password=None*, *socket_timeout=None*, *expire=None*)

Bases: *luigi.target.Target*

Target for a resource in Redis.

Parameters

- **host** (*str*) – Redis server host
- **port** (*int*) – Redis server port
- **db** (*int*) – database index
- **update_id** (*str*) – an identifier for this data hash
- **password** (*str*) – a password to connect to the redis server
- **socket_timeout** (*int*) – client socket timeout
- **expire** (*int*) – timeout before the target is deleted

marker_prefix = Parameter (defaults to luigi)

marker_key()

Generate a key for the indicator hash.

touch()

Mark this update as complete.

We index the parameters *update_id* and *date*.

exists()

Test, if this task has been run.

luigi.contrib.redshift module

class luigi.contrib.redshift.**RedshiftTarget**(*host*, *database*, *user*, *password*, *table*, *update_id*, *port=None*)

Bases: *luigi.contrib.postgres.PostgresTarget*

Target for a resource in Redshift.

Redshift is similar to postgres with a few adjustments required by redshift.

Args: host (str): Postgres server address. Possibly a host:port string. database (str): Database name user (str): Database user password (str): Password for specified user update_id (str): An identifier for this data set port (int): Postgres server port.

marker_table = 'table_updates'

DEFAULT_DB_PORT = 5439

use_db_timestamps = False

class luigi.contrib.redshift.**S3CopyToTable**(**args*, ***kwargs*)

Bases: *luigi.contrib.rdbms.CopyToTable*, luigi.contrib.redshift._CredentialsMixin

Template task for inserting a data set into Redshift from s3.

Usage:

- Subclass and override the required attributes:
  - *host*,
  - *database*,
  - *user*,
  - *password*,
  - *table*,
  - *columns*,
  - *s3_load_path*.
- You can also override the attributes provided by the CredentialsMixin if they are not supplied by your configuration or environment variables.

s3_load_path()
Override to return the load path.

copy_options
Add extra copy options, for example:

- TIMEFORMAT 'auto'
- IGNOREHEADER 1
- TRUNCATECOLUMNS
- IGNOREBLANKLINES
- DELIMITER ' '

prune_table
Override to set equal to the name of the table which is to be pruned. Intended to be used in conjunction with prune_column and prune_date i.e. copy to temp table, prune production table to prune_column with a date greater than prune_date, then insert into production table from temp table

prune_column
Override to set equal to the column of the prune_table which is to be compared Intended to be used in conjunction with prune_table and prune_date i.e. copy to temp table, prune production table to prune_column with a date greater than prune_date, then insert into production table from temp table

prune_date
Override to set equal to the date by which prune_column is to be compared Intended to be used in conjunction with prune_table and prune_column i.e. copy to temp table, prune production table to prune_column with a date greater than prune_date, then insert into production table from temp table

table_attributes
Add extra table attributes, for example:

DISTSTYLE KEY DISTKEY (MY_FIELD) SORTKEY (MY_FIELD_2, MY_FIELD_3)

table_constraints
Add extra table constraints, for example:

PRIMARY KEY (MY_FIELD, MY_FIELD_2) UNIQUE KEY (MY_FIELD_3)

do_truncate_table
Return True if table should be truncated before copying new data in.

do_prune()
Return True if prune_table, prune_column, and prune_date are implemented. If only a subset of prune

variables are override, an exception is raised to remind the user to implement all or none. Prune (data newer than prune_date deleted) before copying new data in.

table_type
Return table type (i.e. 'temp').

queries
Override to return a list of queries to be executed in order.

truncate_table(*connection*)

prune(*connection*)

create_schema(*connection*)
Will create the schema in the database

create_table(*connection*)
Override to provide code for creating the target table.

By default it will be created using types (optionally) specified in columns.

If overridden, use the provided connection object for setting up the table in order to create the table and insert data using the same transaction.

run()
If the target table doesn't exist, self.create_table will be called to attempt to create the table.

copy(*cursor*, *f*)
Defines copying from s3 into redshift.

If both key-based and role-based credentials are provided, role-based will be used.

output()
Returns a RedshiftTarget representing the inserted dataset.

Normally you don't override this.

does_schema_exist(*connection*)
Determine whether the schema already exists.

does_table_exist(*connection*)
Determine whether the table already exists.

init_copy(*connection*)
Perform pre-copy sql - such as creating table, truncating, or removing data older than x.

post_copy(*cursor*)
Performs post-copy sql - such as cleansing data, inserting into production table (if copied to temp table), etc.

post_copy_metacolums(*cursor*)
Performs post-copy to fill metadata columns.

class luigi.contrib.redshift.**S3CopyJSONToTable**(**args*, ***kwargs*)
Bases: *luigi.contrib.redshift.S3CopyToTable*, luigi.contrib.redshift._CredentialsMixin

Template task for inserting a JSON data set into Redshift from s3.

Usage:

- Subclass and override the required attributes:
  - *host*,
  - *database*,

  - *user*,
  - *password*,
  - *table*,
  - *columns*,
  - *s3_load_path*,
  - *jsonpath*,
  - *copy_json_options*.

- You can also override the attributes provided by the CredentialsMixin if they are not supplied by your configuration or environment variables.

jsonpath
Override the jsonpath schema location for the table.

copy_json_options
Add extra copy options, for example:

- GZIP
- LZOP

copy (*cursor*, *f*)
Defines copying JSON from s3 into redshift.

class luigi.contrib.redshift.**RedshiftManifestTask** (**args*, ***kwargs*)
Bases: *luigi.contrib.s3.S3PathTask*

Generic task to generate a manifest file that can be used in S3CopyToTable in order to copy multiple files from your s3 folder into a redshift table at once.

For full description on how to use the manifest file see http://docs.aws.amazon.com/redshift/latest/dg/loading-data-files-using-manifest.html

Usage:

- **requires parameters**
  - **path - s3 path to the generated manifest file, including the** name of the generated file to be copied into a redshift table
  - folder_paths - s3 paths to the folders containing files you wish to be copied

Output:

- generated manifest file

folder_paths = Parameter

text_target = True

run ()
The task run method, to be overridden in a subclass.

See *Task.run*

class luigi.contrib.redshift.**KillOpenRedshiftSessions** (**args*, ***kwargs*)
Bases: *luigi.task.Task*

An task for killing any open Redshift sessions in a given database. This is necessary to prevent open user sessions with transactions against the table from blocking drop or truncate table commands.

Usage:

Subclass and override the required *host*, *database*, *user*, and *password* attributes.

connection_reset_wait_seconds = IntParameter (defaults to 60)

host

database

user

password

update_id
This update id will be a unique identifier for this insert on this table.

output()
Returns a RedshiftTarget representing the inserted dataset.

Normally you don't override this.

run()
Kill any open Redshift sessions for the given database.

class luigi.contrib.redshift.**RedshiftQuery**(**args*, ***kwargs*)
Bases: *luigi.contrib.postgres.PostgresQuery*

Template task for querying an Amazon Redshift database

Usage: Subclass and override the required *host*, *database*, *user*, *password*, *table*, and *query* attributes.

Override the *run* method if your use case requires some action with the query result.

Task instances require a dynamic *update_id*, e.g. via parameter(s), otherwise the query will only execute once

To customize the query signature as recorded in the database marker table, override the *update_id* property.

output()
Returns a RedshiftTarget representing the executed query.

Normally you don't override this.

class luigi.contrib.redshift.**RedshiftUnloadTask**(**args*, ***kwargs*)
Bases: *luigi.contrib.postgres.PostgresQuery*, luigi.contrib.redshift._CredentialsMixin

Template task for running UNLOAD on an Amazon Redshift database

Usage: Subclass and override the required *host*, *database*, *user*, *password*, *table*, and *query* attributes. Optionally, override the *autocommit* attribute to run the query in autocommit mode - this is necessary to run VACUUM for example. Override the *run* method if your use case requires some action with the query result. Task instances require a dynamic *update_id*, e.g. via parameter(s), otherwise the query will only execute once To customize the query signature as recorded in the database marker table, override the *update_id* property. You can also override the attributes provided by the CredentialsMixin if they are not supplied by your configuration or environment variables.

s3_unload_path
Override to return the load path.

unload_options
Add extra or override default unload options:

unload_query
Default UNLOAD command

run()
The task run method, to be overridden in a subclass.

See *Task.run*

output()
Returns a RedshiftTarget representing the executed query.

Normally you don't override this.

luigi.contrib.s3 module

Implementation of Simple Storage Service support. `S3Target` is a subclass of the Target class to support S3 file system operations. The *boto3* library is required to use S3 targets.

exception `luigi.contrib.s3.`**InvalidDeleteException**
Bases: `luigi.target.FileSystemException`

exception `luigi.contrib.s3.`**FileNotFoundException**
Bases: `luigi.target.FileSystemException`

exception `luigi.contrib.s3.`**DeprecatedBotoClientException**
Bases: `exceptions.Exception`

class `luigi.contrib.s3.`**S3Client**(*aws_access_key_id=None*, *aws_secret_access_key=None*, *aws_session_token=None*, ***kwargs*)
Bases: `luigi.target.FileSystem`

boto3-powered S3 client.

DEFAULT_PART_SIZE = 8388608

DEFAULT_THREADS = 100

s3

exists(*path*)
Does provided path exist on S3?

remove(*path*, *recursive=True*)
Remove a file or directory from S3. :param path: File or directory to remove :param recursive: Boolean indicator to remove object and children :return: Boolean indicator denoting success of the removal of 1 or more files

move(*source_path*, *destination_path*, ***kwargs*)
Rename/move an object from one S3 location to another. :param source_path: The *s3://* path of the directory or key to copy from :param destination_path: The *s3://* path of the directory or key to copy to :param kwargs: Keyword arguments are passed to the boto3 function *copy*

get_key(*path*)
Returns the object summary at the path

put(*local_path*, *destination_s3_path*, ***kwargs*)
Put an object stored locally to an S3 path. :param local_path: Path to source local file :param destination_s3_path: URL for target S3 location :param kwargs: Keyword arguments are passed to the boto function *put_object*

put_string(*content*, *destination_s3_path*, ***kwargs*)
Put a string to an S3 path. :param content: Data str :param destination_s3_path: URL for target S3 location :param kwargs: Keyword arguments are passed to the boto3 function *put_object*

put_multipart (*local_path*, *destination_s3_path*, *part_size=8388608*, ***kwargs*)
Put an object stored locally to an S3 path using S3 multi-part upload (for files > 8Mb). :param local_path: Path to source local file :param destination_s3_path: URL for target S3 location :param part_size: Part size in bytes. Default: 8388608 (8MB) :param kwargs: Keyword arguments are passed to the boto function *upload_fileobj* as ExtraArgs

copy (*source_path*, *destination_path*, *threads=100*, *start_time=None*, *end_time=None*, *part_size=8388608*, ***kwargs*)
Copy object(s) from one S3 location to another. Works for individual keys or entire directories. When files are larger than *part_size*, multipart uploading will be used. :param source_path: The *s3://* path of the directory or key to copy from :param destination_path: The *s3://* path of the directory or key to copy to :param threads: Optional argument to define the number of threads to use when copying (min: 3 threads) :param start_time: Optional argument to copy files with modified dates after start_time :param end_time: Optional argument to copy files with modified dates before end_time :param part_size: Part size in bytes :param kwargs: Keyword arguments are passed to the boto function *copy* as ExtraArgs :returns tuple (number_of_files_copied, total_size_copied_in_bytes)

get (*s3_path*, *destination_local_path*)
Get an object stored in S3 and write it to a local path.

get_as_bytes (*s3_path*)
Get the contents of an object stored in S3 as bytes

Parameters **s3_path** – URL for target S3 location

Returns File contents as pure bytes

get_as_string (*s3_path*, *encoding='utf-8'*)
Get the contents of an object stored in S3 as string.

Parameters

- **s3_path** – URL for target S3 location
- **encoding** – Encoding to decode bytes to string

Returns File contents as a string

isdir (*path*)
Is the parameter S3 path a directory?

is_dir (*path*)
Is the parameter S3 path a directory?

mkdir (*path*, *parents=True*, *raise_if_exists=False*)
Create directory at location `path`

Creates the directory at `path` and implicitly create parent directories if they do not already exist.

Parameters

- **path** (*str*) – a path within the FileSystem to create as a directory.
- **parents** (*bool*) – Create parent directories when necessary. When parents=False and the parent directory doesn't exist, raise luigi.target.MissingParentDirectory
- **raise_if_exists** (*bool*) – raise luigi.target.FileAlreadyExists if the folder already exists.

listdir (*path*, *start_time=None*, *end_time=None*, *return_key=False*)
Get an iterable with S3 folder contents. Iterable contains paths relative to queried path. :param path: URL for target S3 location :param start_time: Optional argument to list files with modified (offset aware) datetime after start_time :param end_time: Optional argument to list files with modified (offset aware)

datetime before end_time :param return_key: Optional argument, when set to True will return boto3's ObjectSummary (instead of the filename)

list (*path*, *start_time=None*, *end_time=None*, *return_key=False*)

class luigi.contrib.s3.**AtomicS3File** (*path*, *s3_client*, ***kwargs*)
Bases: *luigi.target.AtomicLocalFile*

An S3 file that writes to a temp file and puts to S3 on close.

Parameters kwargs – Keyword arguments are passed to the boto function *initiate_multipart_upload*

move_to_final_destination ()

class luigi.contrib.s3.**ReadableS3File** (*s3_key*)
Bases: object

read (*size=None*)

close ()

readable ()

writable ()

seekable ()

class luigi.contrib.s3.**S3Target** (*path*, *format=None*, *client=None*, ***kwargs*)
Bases: *luigi.target.FileSystemTarget*

Target S3 file object

Parameters kwargs – Keyword arguments are passed to the boto function *initiate_multipart_upload*

fs = None

open (*mode='r'*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters mode (*str*) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

class luigi.contrib.s3.**S3FlagTarget** (*path*, *format=None*, *client=None*, *flag='_SUCCESS'*)
Bases: *luigi.contrib.s3.S3Target*

Defines a target directory with a flag-file (defaults to *_SUCCESS*) used to signify job success.

This checks for two things:

- the path exists (just like the S3Target)
- the _SUCCESS file exists within the directory.

Because Hadoop outputs into a directory and not a single file, the path is assumed to be a directory.

This is meant to be a handy alternative to AtomicS3File.

The AtomicFile approach can be burdensome for S3 since there are no directories, per se.

If we have 1,000,000 output files, then we have to rename 1,000,000 objects.

Initializes a S3FlagTarget.

Parameters

- **path** (*str*) – the directory where the files are stored.
- **client** –
- **flag** (*str*) –

fs = None

exists()

Returns `True` if the path for this FileSystemTarget exists; `False` otherwise.

This method is implemented by using *fs*.

class luigi.contrib.s3.**S3EmrTarget**(**args*, ***kwargs*)

Bases: *luigi.contrib.s3.S3FlagTarget*

Deprecated. Use *S3FlagTarget*

class luigi.contrib.s3.**S3PathTask**(**args*, ***kwargs*)

Bases: *luigi.task.ExternalTask*

A external task that to require existence of a path in S3.

path = Parameter

output()

The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

class luigi.contrib.s3.**S3EmrTask**(**args*, ***kwargs*)

Bases: *luigi.task.ExternalTask*

An external task that requires the existence of EMR output in S3.

path = Parameter

output()

The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

class luigi.contrib.s3.**S3FlagTask**(**args*, ***kwargs*)

Bases: *luigi.task.ExternalTask*

An external task that requires the existence of EMR output in S3.

path = Parameter

flag = OptionalParameter (defaults to None)

output()

The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

luigi.contrib.salesforce module

`luigi.contrib.salesforce.`**`get_soql_fields`**(*soql*)

Gets queried columns names.

`luigi.contrib.salesforce.`**`ensure_utf`**(*value*)

`luigi.contrib.salesforce.`**`parse_results`**(*fields*, *data*)

Traverses ordered dictionary, calls _traverse_results() to recursively read into the dictionary depth of data

class `luigi.contrib.salesforce.`**`salesforce`**(**args*, ***kwargs*)

Bases: `luigi.task.Config`

Config system to get config vars from 'salesforce' section in configuration file.

Did not include sandbox_name here, as the user may have multiple sandboxes.

`username = Parameter (defaults to )`

`password = Parameter (defaults to )`

`security_token = Parameter (defaults to )`

`sb_security_token = Parameter (defaults to )`

class `luigi.contrib.salesforce.`**`QuerySalesforce`**(**args*, ***kwargs*)

Bases: `luigi.task.Task`

`object_name`

Override to return the SF object we are querying. Must have the SF "__c" suffix if it is a customer object.

`use_sandbox`

Override to specify use of SF sandbox. True iff we should be uploading to a sandbox environment instead of the production organization.

`sandbox_name`

Override to specify the sandbox name if it is intended to be used.

`soql`

Override to return the raw string SOQL or the path to it.

`is_soql_file`

Override to True if soql property is a file path.

`content_type`

Override to use a different content type. Salesforce allows XML, CSV, ZIP_CSV, or ZIP_XML. Defaults to CSV.

`run`()

The task run method, to be overridden in a subclass.

See *Task.run*

merge_batch_results(*result_ids*)
Merges the resulting files of a multi-result batch bulk query.

class luigi.contrib.salesforce.**SalesforceAPI**(*username*, *password*, *security_token*, *sb_token=None*, *sandbox_name=None*)
Bases: object

Class used to interact with the SalesforceAPI. Currently provides only the methods necessary for performing a bulk upload operation.

API_VERSION = 34.0

SOAP_NS = '{urn:partner.soap.sforce.com}'

API_NS = '{http://www.force.com/2009/06/asyncapi/dataload}'

start_session()
Starts a Salesforce session and determines which SF instance to use for future requests.

has_active_session()

query(*query*, ***kwargs*)
Return the result of a Salesforce SOQL query as a dict decoded from the Salesforce response JSON payload.

Parameters query – the SOQL query to send to Salesforce, e.g. "SELECT id from Lead WHERE email = 'a@b.com'"

query_more(*next_records_identifier*, *identifier_is_url=False*, ***kwargs*)
Retrieves more results from a query that returned more results than the batch maximum. Returns a dict decoded from the Salesforce response JSON payload.

Parameters

- **next_records_identifier** – either the Id of the next Salesforce object in the result, or a URL to the next record in the result.
- **identifier_is_url** – True if *next_records_identifier* should be treated as a URL, False if *next_records_identifer* should be treated as an Id.

query_all(*query*, ***kwargs*)
Returns the full set of results for the *query*. This is a convenience wrapper around *query(. . .)* and *query_more(. . .)*. The returned dict is the decoded JSON payload from the final call to Salesforce, but with the *totalSize* field representing the full number of results retrieved and the *records* list representing the full list of records retrieved.

Parameters query – the SOQL query to send to Salesforce, e.g. *SELECT Id FROM Lead WHERE Email = "waldo@somewhere.com"*

restful(*path*, *params*)
Allows you to make a direct REST call if you know the path Arguments: :param path: The path of the request. Example: sobjects/User/ABC123/password' :param params: dict of parameters to pass to the path

create_operation_job(*operation*, *obj*, *external_id_field_name=None*, *content_type=None*)
Creates a new SF job that for doing any operation (insert, upsert, update, delete, query)

Parameters

- **operation** – delete, insert, query, upsert, update, hardDelete. Must be lowercase.
- **obj** – Parent SF object
- **external_id_field_name** – Optional.

get_job_details (*job_id*)
Gets all details for existing job

Parameters **job_id** – job_id as returned by 'create_operation_job(…)'

Returns job info as xml

abort_job (*job_id*)
Abort an existing job. When a job is aborted, no more records are processed. Changes to data may already have been committed and aren't rolled back.

Parameters **job_id** – job_id as returned by 'create_operation_job(…)'

Returns abort response as xml

close_job (*job_id*)
Closes job

Parameters **job_id** – job_id as returned by 'create_operation_job(…)'

Returns close response as xml

create_batch (*job_id*, *data*, *file_type*)
Creates a batch with either a string of data or a file containing data.

If a file is provided, this will pull the contents of the file_target into memory when running. That shouldn't be a problem for any files that meet the Salesforce single batch upload size limit (10MB) and is done to ensure compressed files can be uploaded properly.

Parameters

- **job_id** – job_id as returned by 'create_operation_job(…)'
- **data** –

Returns Returns batch_id

block_on_batch (*job_id*, *batch_id*, *sleep_time_seconds=5*, *max_wait_time_seconds=-1*)
Blocks until @batch_id is completed or failed. :param job_id: :param batch_id: :param sleep_time_seconds: :param max_wait_time_seconds:

get_batch_results (*job_id*, *batch_id*)
DEPRECATED: Use *get_batch_result_ids*

get_batch_result_ids (*job_id*, *batch_id*)
Get result IDs of a batch that has completed processing.

Parameters

- **job_id** – job_id as returned by 'create_operation_job(…)'
- **batch_id** – batch_id as returned by 'create_batch(…)'

Returns list of batch result IDs to be used in 'get_batch_result(…)'

get_batch_result (*job_id*, *batch_id*, *result_id*)
Gets result back from Salesforce as whatever type was originally sent in create_batch (xml, or csv). :param job_id: :param batch_id: :param result_id:

luigi.contrib.scalding module

`luigi.contrib.scalding.`**logger = <logging.Logger object>**
Scalding support for Luigi.

Example configuration section in luigi.cfg:

```
[scalding]
# scala home directory, which should include a lib subdir with scala jars.
scala-home: /usr/share/scala

# scalding home directory, which should include a lib subdir with
# scalding-*-assembly-* jars as built from the official Twitter build script.
scalding-home: /usr/share/scalding

# provided dependencies, e.g. jars required for compiling but not executing
# scalding jobs. Currently required jars:
# org.apache.hadoop/hadoop-core/0.20.2
# org.slf4j/slf4j-log4j12/1.6.6
# log4j/log4j/1.2.15
# commons-httpclient/commons-httpclient/3.1
# commons-cli/commons-cli/1.2
# org.apache.zookeeper/zookeeper/3.3.4
scalding-provided: /usr/share/scalding/provided

# additional jars required.
scalding-libjars: /usr/share/scalding/libjars
```

class luigi.contrib.scalding.**ScaldingJobRunner**

Bases: *luigi.contrib.hadoop.JobRunner*

JobRunner for *pyscald* commands. Used to run a ScaldingJobTask.

get_scala_jars(*include_compiler=False*)

get_scalding_jars()

get_scalding_core()

get_provided_jars()

get_libjars()

get_tmp_job_jar(*source*)

get_build_dir(*source*)

get_job_class(*source*)

build_job_jar(*job*)

run_job(*job, tracking_url_callback=None*)

class luigi.contrib.scalding.**ScaldingJobTask**(**args, **kwargs*)

Bases: *luigi.contrib.hadoop.BaseHadoopJobTask*

A job task for Scalding that define a scala source and (optional) main method.

requires() should return a dictionary where the keys are Scalding argument names and values are sub tasks or lists of subtasks.

For example:

```
{'input1': A, 'input2': C} => --input1 <Aoutput> --input2 <Coutput>
{'input1': [A, B], 'input2': [C]} => --input1 <Aoutput> <Boutput> --input2
↪<Coutput>
```

relpath(*current_file, rel_path*)

Compute path given current file and relative path.

source()
Path to the scala source for this Scalding Job

Either one of source() or jar() must be specified.

jar()
Path to the jar file for this Scalding Job

Either one of source() or jar() must be specified.

extra_jars()
Extra jars for building and running this Scalding Job.

job_class()
optional main job class for this Scalding Job.

job_runner()

atomic_output()
If True, then rewrite output arguments to be temp locations and atomically move them into place after the job finishes.

requires()
The Tasks that this Task depends on.

A Task will only run if all of the Tasks that it requires are completed. If your Task does not require any other Tasks, then you don't need to override this method. Otherwise, a subclass can override this method to return a single Task, a list of Task instances, or a dict whose values are Task instances.

See *Task.requires*

job_args()
Extra arguments to pass to the Scalding job.

args()
Returns an array of args to pass to the job.

luigi.contrib.sge module

SGE batch system Tasks.

Adapted by Jake Feala (@jfeala) from LSF extension by Alex Wiltschko (@alexbw) Maintained by Jake Feala (@jfeala)

SunGrid Engine is a job scheduler used to allocate compute resources on a shared cluster. Jobs are submitted using the `qsub` command and monitored using `qstat`. To get started, install luigi on all nodes.

To run luigi workflows on an SGE cluster, subclass *`luigi.contrib.sge.SGEJobTask`* as you would any *`luigi.Task`*, but override the `work()` method, instead of `run()`, to define the job code. Then, run your Luigi workflow from the master node, assigning > 1 `workers` in order to distribute the tasks in parallel across the cluster.

The following is an example usage (and can also be found in `sge_tests.py`)

```
import logging
import luigi
import os
from luigi.contrib.sge import SGEJobTask

logger = logging.getLogger('luigi-interface')
```

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```
class TestJobTask(SGEJobTask):

    i = luigi.Parameter()

    def work(self):
        logger.info('Running test job...')
        with open(self.output().path, 'w') as f:
            f.write('this is a test')

    def output(self):
        return luigi.LocalTarget(os.path.join('/home', 'testfile_' + str(self.i)))


if __name__ == '__main__':
    tasks = [TestJobTask(i=str(i), n_cpu=i+1) for i in range(3)]
    luigi.build(tasks, local_scheduler=True, workers=3)
```

The `n-cpu` parameter allows you to define different compute resource requirements (or slots, in SGE terms) for each task. In this example, the third Task asks for 3 CPU slots. If your cluster only contains nodes with 2 CPUs, this task will hang indefinitely in the queue. See the docs for *`luigi.contrib.sge.SGEJobTask`* for other SGE parameters. As for any task, you can also set these in your luigi configuration file as shown below. The default values below were matched to the values used by MIT StarCluster, an open-source SGE cluster manager for use with Amazon EC2:

```
[SGEJobTask]
shared-tmp-dir = /home
parallel-env = orte
n-cpu = 2
```

class `luigi.contrib.sge.`**`SGEJobTask`**(**args*, ***kwargs*)

Bases: *`luigi.task.Task`*

Base class for executing a job on SunGrid Engine

Override `work()` (rather than `run()`) with your job code.

Parameters:

- **n_cpu: Number of CPUs (or "slots") to allocate for the Task. This** value is passed as `qsub -pe {pe} {n_cpu}`
- **parallel_env: SGE parallel environment name. The default is "orte",** the parallel environment installed with MIT StarCluster. If you are using a different cluster environment, check with your sysadmin for the right pe to use. This value is passed as {pe} to the qsub command above.
- **shared_tmp_dir: Shared drive accessible from all nodes in the cluster.** Task classes and dependencies are pickled to a temporary folder on this drive. The default is `/home`, the NFS share location setup by StarCluster
- **job_name_format: String that can be passed in to customize the job name** string passed to qsub; e.g. "Task123_{task_family}_{n_cpu}. . . ".
- job_name: Exact job name to pass to qsub.
- run_locally: Run locally instead of on the cluster.
- poll_time: the length of time to wait in order to poll qstat
- dont_remove_tmp_dir: Instead of deleting the temporary directory, keep it.

- **no_tarball: Don't create a tarball of the luigi project directory. Can be** useful to reduce I/O requirements when the luigi directory is accessible from cluster nodes already.

n_cpu = Insignificant IntParameter (defaults to 2)

shared_tmp_dir = Insignificant Parameter (defaults to /home)

parallel_env = Insignificant Parameter (defaults to orte)

job_name_format = Insignificant Parameter (defaults to None): A string that can be fo

run_locally = Insignificant BoolParameter (defaults to False): run locally instead of

poll_time = Insignificant IntParameter (defaults to 5): specify the wait time to poll

dont_remove_tmp_dir = Insignificant BoolParameter (defaults to False): don't delete t

no_tarball = Insignificant BoolParameter (defaults to False): don't tarball (and extr

job_name = Insignificant Parameter (defaults to None): Explicit job name given via qs

run()
The task run method, to be overridden in a subclass.

See *Task.run*

work()
Override this method, rather than `run()`, for your actual work.

class `luigi.contrib.sge.`**LocalSGEJobTask**(**args*, ***kwargs*)
Bases: *`luigi.contrib.sge.SGEJobTask`*

A local version of SGEJobTask, for easier debugging.

This version skips the `qsub` steps and simply runs `work()` on the local node, so you don't need to be on an SGE cluster to use your Task in a test workflow.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

luigi.contrib.sge_runner module

The SunGrid Engine runner

The main() function of this module will be executed on the compute node by the submitted job. It accepts as a single argument the shared temp folder containing the package archive and pickled task to run, and carries out these steps:

- extract tarfile of package dependencies and place on the path
- unpickle SGETask instance created on the master node
- run SGETask.work()

On completion, SGETask on the master node will detect that the job has left the queue, delete the temporary folder, and return from SGETask.run()

`luigi.contrib.sge_runner.`**main**(*args=['/home/docs/checkouts/readthedocs.org/user_builds/luigi/envs/latest/bin/sphinx-build', '-b', 'latex', '-D', 'language=en', '-d', '_build/doctrees', '.', '_build/latex']*)
Run the work() method from the class instance in the file "job-instance.pickle".

luigi.contrib.simulate module

A module containing classes used to simulate certain behaviors

class luigi.contrib.simulate.**RunAnywayTarget**(*task_obj*)

Bases: *luigi.target.Target*

A target used to make a task run every time it is called.

Usage:

Pass *self* as the first argument in your task's *output*:

And then mark it as *done* in your task's *run*:

temp_dir = '/tmp/luigi-simulate'

temp_time = 86400

unique = <Synchronized wrapper for c_int(0)>

get_path()

Returns a temporary file path based on a MD5 hash generated with the task's name and its arguments

exists()

Checks if the file exists

done()

Creates temporary file to mark the task as *done*

luigi.contrib.spark module

class luigi.contrib.spark.**SparkSubmitTask**(**args*, ***kwargs*)

Bases: *luigi.contrib.external_program.ExternalProgramTask*

Template task for running a Spark job

Supports running jobs on Spark local, standalone, Mesos or Yarn

See http://spark.apache.org/docs/latest/submitting-applications.html for more information

name = None

entry_class = None

app = None

always_log_stderr = False

stream_for_searching_tracking_url = 'stderr'

tracking_url_pattern

app_options()

Subclass this method to map your task parameters to the app's arguments

pyspark_python

pyspark_driver_python

hadoop_user_name

spark_version

spark_submit

master

deploy_mode

jars

packages

py_files

files

conf

properties_file

driver_memory

driver_java_options

driver_library_path

driver_class_path

executor_memory

driver_cores

supervise

total_executor_cores

executor_cores

queue

num_executors

archives

hadoop_conf_dir

get_environment()

program_environment()
Override this method to control environment variables for the program

Returns dict mapping environment variable names to values

program_args()
Override this method to map your task parameters to the program arguments

Returns list to pass as `args` to `subprocess.Popen`

spark_command()

app_command()

class luigi.contrib.spark.**PySparkTask**(**args*, ***kwargs*)
Bases: *luigi.contrib.spark.SparkSubmitTask*

Template task for running an inline PySpark job

Simply implement the `main` method in your subclass

You can optionally define package names to be distributed to the cluster with `py_packages` (uses luigi's global py-packages configuration by default)

app = '/home/docs/checkouts/readthedocs.org/user_builds/luigi/envs/latest/lib/python2.

name

py_packages

files

setup (*conf*)
Called by the pyspark_runner with a SparkConf instance that will be used to instantiate the SparkContext

Parameters **conf** – SparkConf

setup_remote (*sc*)

main (*sc*, **args*)
Called by the pyspark_runner with a SparkContext and any arguments returned by `app_options()`

Parameters

- **sc** – SparkContext
- **args** – arguments list

app_command ()

run ()
The task run method, to be overridden in a subclass.

See *Task.run*

luigi.contrib.sparkey module

class luigi.contrib.sparkey.**SparkeyExportTask** (**args*, ***kwargs*)
Bases: *luigi.task.Task*

A luigi task that writes to a local sparkey log file.

Subclasses should implement the requires and output methods. The output must be a luigi.LocalTarget.

The resulting sparkey log file will contain one entry for every line in the input, mapping from the first value to a tab-separated list of the rest of the line.

To generate a simple key-value index, yield "key", "value" pairs from the input(s) to this task.

separator = '\t'

run ()
The task run method, to be overridden in a subclass.

See *Task.run*

luigi.contrib.sqla module

Support for SQLAlchmey. Provides SQLAlchemyTarget for storing in databases supported by SQLAlchemy. The user would be responsible for installing the required database driver to connect using SQLAlchemy.

Minimal example of a job to copy data to database using SQLAlchemy is as shown below:

```
from sqlalchemy import String
import luigi
from luigi.contrib import sqla

class SQLATask(sqla.CopyToTable):
```

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```
    # columns defines the table schema, with each element corresponding
    # to a column in the format (args, kwargs) which will be sent to
    # the sqlalchemy.Column(*args, **kwargs)
    columns = [
        (["item", String(64)], {"primary_key": True}),
        (["property", String(64)], {})
    ]
    connection_string = "sqlite://"  # in memory SQLite database
    table = "item_property"  # name of the table to store data

    def rows(self):
        for row in [("item1", "property1"), ("item2", "property2")]:
            yield row

if __name__ == '__main__':
    task = SQLATask()
    luigi.build([task], local_scheduler=True)
```

If the target table where the data needs to be copied already exists, then the column schema definition can be skipped and instead the reflect flag can be set as True. Here is a modified version of the above example:

```
from sqlalchemy import String
import luigi
from luigi.contrib import sqla

class SQLATask(sqla.CopyToTable):
    # If database table is already created, then the schema can be loaded
    # by setting the reflect flag to True
    reflect = True
    connection_string = "sqlite://"  # in memory SQLite database
    table = "item_property"  # name of the table to store data

    def rows(self):
        for row in [("item1", "property1"), ("item2", "property2")]:
            yield row

if __name__ == '__main__':
    task = SQLATask()
    luigi.build([task], local_scheduler=True)
```

In the above examples, the data that needs to be copied was directly provided by overriding the rows method. Alternately, if the data comes from another task, the modified example would look as shown below:

```
from sqlalchemy import String
import luigi
from luigi.contrib import sqla
from luigi.mock import MockTarget

class BaseTask(luigi.Task):
    def output(self):
        return MockTarget("BaseTask")

    def run(self):
        out = self.output().open("w")
        TASK_LIST = ["item%d\tproperty%d\n" % (i, i) for i in range(10)]
        for task in TASK_LIST:
```

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```
            out.write(task)
        out.close()

class SQLATask(sqla.CopyToTable):
    # columns defines the table schema, with each element corresponding
    # to a column in the format (args, kwargs) which will be sent to
    # the sqlalchemy.Column(*args, **kwargs)
    columns = [
        (["item", String(64)], {"primary_key": True}),
        (["property", String(64)], {})
    ]
    connection_string = "sqlite://"  # in memory SQLite database
    table = "item_property"  # name of the table to store data

    def requires(self):
        return BaseTask()

if __name__ == '__main__':
    task1, task2 = SQLATask(), BaseTask()
    luigi.build([task1, task2], local_scheduler=True)
```

In the above example, the output from *BaseTask* is copied into the database. Here we did not have to implement the *rows* method because by default *rows* implementation assumes every line is a row with column values separated by a tab. One can define *column_separator* option for the task if the values are say comma separated instead of tab separated.

You can pass in database specific connection arguments by setting the connect_args dictionary. The options will be passed directly to the DBAPI's connect method as keyword arguments.

The other option to *sqla.CopyToTable* that can be of help with performance aspect is the *chunk_size*. The default is 5000. This is the number of rows that will be inserted in a transaction at a time. Depending on the size of the inserts, this value can be tuned for performance.

See here for a tutorial on building task pipelines using luigi and using SQLAlchemy in workflow pipelines.

Author: Gouthaman Balaraman Date: 01/02/2015

class luigi.contrib.sqla.**SQLAlchemyTarget**(*connection_string*, *target_table*, *update_id*, *echo=False*, *connect_args=None*)

Bases: *luigi.target.Target*

Database target using SQLAlchemy.

This will rarely have to be directly instantiated by the user.

Typical usage would be to override *luigi.contrib.sqla.CopyToTable* class to create a task to write to the database.

Constructor for the SQLAlchemyTarget.

Parameters

- **connection_string** (*str*) – SQLAlchemy connection string
- **target_table** (*str*) – The table name for the data
- **update_id** (*str*) – An identifier for this data set
- **echo** (*bool*) – Flag to setup SQLAlchemy logging
- **connect_args** (*dict*) – A dictionary of connection arguments

Returns

marker_table = None

class Connection(*engine*, *pid*)
Bases: `tuple`

Create new instance of Connection(engine, pid)

engine
Alias for field number 0

pid
Alias for field number 1

engine
Return an engine instance, creating it if it doesn't exist.

Recreate the engine connection if it wasn't originally created by the current process.

touch()
Mark this update as complete.

exists()
Returns `True` if the `Target` exists and `False` otherwise.

create_marker_table()
Create marker table if it doesn't exist.

Using a separate connection since the transaction might have to be reset.

open(*mode*)

class luigi.contrib.sqla.**CopyToTable**(**args*, ***kwargs*)
Bases: *luigi.task.Task*

An abstract task for inserting a data set into SQLAlchemy RDBMS

Usage:

- subclass and override the required *connection_string*, *table* and *columns* attributes.
- optionally override the *schema* attribute to use a different schema for the target table.

echo = False

connect_args = {}

connection_string

table

columns = []

schema = ''

column_separator = '\t'

chunk_size = 5000

reflect = False

create_table(*engine*)
Override to provide code for creating the target table.

By default it will be created using types specified in columns. If the table exists, then it binds to the existing table.

If overridden, use the provided connection object for setting up the table in order to create the table and insert data using the same transaction. :param engine: The sqlalchemy engine instance :type engine: object

update_id()
: This update id will be a unique identifier for this insert on this table.

output()
: The output that this Task produces.

  The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

  Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

  See *Task.output*

rows()
: Return/yield tuples or lists corresponding to each row to be inserted.

  This method can be overridden for custom file types or formats.

run()
: The task run method, to be overridden in a subclass.

  See *Task.run*

copy(*conn*, *ins_rows*, *table_bound*)
: This method does the actual insertion of the rows of data given by ins_rows into the database. A task that needs row updates instead of insertions should overload this method. :param conn: The sqlalchemy connection object :param ins_rows: The dictionary of rows with the keys in the format _<column_name>. For example if you have a table with a column name “property”, then the key in the dictionary would be “_property”. This format is consistent with the bindparam usage in sqlalchemy. :param table_bound: The object referring to the table :return:

luigi.contrib.ssh module

Light-weight remote execution library and utilities.

There are some examples in the unittest but I added another that is more luigi-specific in the examples directory (examples/ssh_remote_execution.py)

`RemoteContext` is meant to provide functionality similar to that of the standard library subprocess module, but where the commands executed are run on a remote machine instead, without the user having to think about prefixing everything with “ssh” and credentials etc.

Using this mini library (which is just a convenience wrapper for subprocess), *`RemoteTarget`* is created to let you stream data from a remotely stored file using the luigi *`FileSystemTarget`* semantics.

As a bonus, *`RemoteContext`* also provides a really cool feature that let's you set up ssh tunnels super easily using a python context manager (there is an example in the integration part of unittests).

This can be super convenient when you want secure communication using a non-secure protocol or circumvent firewalls (as long as they are open for ssh traffic).

exception `luigi.contrib.ssh.`**RemoteCalledProcessError**(*returncode*, *command*, *host*, *output=None*)
: Bases: `subprocess.CalledProcessError`

class `luigi.contrib.ssh.`**RemoteContext**(*host*, ***kwargs*)
: Bases: `object`

  Popen(*cmd*, ***kwargs*)
  : Remote Popen.

check_output (*cmd*)
Execute a shell command remotely and return the output.

Simplified version of Popen when you only want the output as a string and detect any errors.

tunnel (***kwds*)
Open a tunnel between localhost:local_port and remote_host:remote_port via the host specified by this context.

Remember to close() the returned “tunnel” object in order to clean up after yourself when you are done with the tunnel.

class luigi.contrib.ssh.**RemoteFileSystem** (*host*, ***kwargs*)
Bases: *luigi.target.FileSystem*

exists (*path*)
Return *True* if file or directory at *path* exist, False otherwise.

listdir (*path*)
Return a list of files rooted in path.

This returns an iterable of the files rooted at `path`. This is intended to be a recursive listing.

Parameters **path** (*str*) – a path within the FileSystem to list.

Note: This method is optional, not all FileSystem subclasses implements it.

isdir (*path*)
Return *True* if directory at *path* exist, False otherwise.

remove (*path*, *recursive=True*)
Remove file or directory at location *path*.

mkdir (*path*, *parents=True*, *raise_if_exists=False*)
Create directory at location `path`

Creates the directory at `path` and implicitly create parent directories if they do not already exist.

Parameters

- **path** (*str*) – a path within the FileSystem to create as a directory.
- **parents** (*bool*) – Create parent directories when necessary. When parents=False and the parent directory doesn’t exist, raise luigi.target.MissingParentDirectory
- **raise_if_exists** (*bool*) – raise luigi.target.FileAlreadyExists if the folder already exists.

put (*local_path*, *path*)

get (*path*, *local_path*)

class luigi.contrib.ssh.**AtomicRemoteFileWriter** (*fs*, *path*)
Bases: *luigi.format.OutputPipeProcessWrapper*

close ()

tmp_path

fs

class luigi.contrib.ssh.**RemoteTarget** (*path*, *host*, *format=None*, ***kwargs*)
Bases: *luigi.target.FileSystemTarget*

Target used for reading from remote files.

The target is implemented using ssh commands streaming data over the network.

fs

open(*mode='r'*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters mode (`str`) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

put(*local_path*)

get(*local_path*)

luigi.contrib.target module

class luigi.contrib.target.**CascadingClient**(*clients*, *method_names=None*)
Bases: `object`

A FilesystemClient that will cascade failing function calls through a list of clients.

Which clients are used are specified at time of construction.

ALL_METHOD_NAMES = ['exists', 'rename', 'remove', 'chmod', 'chown', 'count', 'copy', '

luigi.contrib.webhdfs module

Provides a *WebHdfsTarget* using the Python hdfs

This module is DEPRECATED and does not play well with rest of luigi's hdfs contrib module. You can consider migrating to *luigi.contrib.hdfs.webhdfs_client.WebHdfsClient*

class luigi.contrib.webhdfs.**WebHdfsTarget**(*path*, *client=None*, *format=None*)
Bases: *luigi.target.FileSystemTarget*

fs = None

open(*mode='r'*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters mode (`str`) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

class luigi.contrib.webhdfs.**ReadableWebHdfsFile**(*path*, *client*)
Bases: `object`

read()

readlines(*char='\n'*)

close()

class luigi.contrib.webhdfs.**AtomicWebHdfsFile**(*path*, *client*)
Bases: *luigi.target.AtomicLocalFile*

An Hdfs file that writes to a temp file and put to WebHdfs on close.

move_to_final_destination()

Module contents

Package containing optional and-on functionality.

luigi.tools package

Submodules

luigi.tools.deps module

luigi.tools.deps.**get_task_requires**(*task*)

luigi.tools.deps.**dfs_paths**(*start_task*, *goal_task_family*, *path=None*)

class luigi.tools.deps.**upstream**(**args*, ***kwargs*)
Bases: *luigi.task.Config*

Used to provide the parameter upstream-family

family = OptionalParameter (defaults to None)

luigi.tools.deps.**find_deps**(*task*, *upstream_task_family*)
Finds all dependencies that start with the given task and have a path to upstream_task_family

Returns all deps on all paths between task and upstream

luigi.tools.deps.**find_deps_cli**()
Finds all tasks on all paths from provided CLI task

luigi.tools.deps.**get_task_output_description**(*task_output*)
Returns a task's output as a string

luigi.tools.deps.**main**()

luigi.tools.deps_tree module

This module parses commands exactly the same as the luigi task runner. You must specify the module, the task and task paramters. Instead of executing a task, this module prints the significant paramters and state of the task and its dependencies in a tree format. Use this to visualize the execution plan in the terminal.

```
$ luigi-deps-tree --module foo_complex examples.Foo
...
└--[Foo-{} (PENDING)]
   |--[Bar-{'num': '0'} (PENDING)]
   |  |--[Bar-{'num': '4'} (PENDING)]
   |  └--[Bar-{'num': '5'} (PENDING)]
   |--[Bar-{'num': '1'} (PENDING)]
   └--[Bar-{'num': '2'} (PENDING)]
      └--[Bar-{'num': '6'} (PENDING)]
         |--[Bar-{'num': '7'} (PENDING)]
         |  |--[Bar-{'num': '9'} (PENDING)]
         |  └--[Bar-{'num': '10'} (PENDING)]
         |     └--[Bar-{'num': '11'} (PENDING)]
```

(continues on next page)

(continued from previous page)

```
        └--[Bar-{'num': '8'} (PENDING)]
           └--[Bar-{'num': '12'} (PENDING)]
```

class luigi.tools.deps_tree.**bcolors**

colored output for task status

OKBLUE = '\x1b[94m'

OKGREEN = '\x1b[92m'

ENDC = '\x1b[0m'

luigi.tools.deps_tree.**print_tree**(*task*, *indent=''*, *last=True*)

Return a string representation of the tasks, their statuses/parameters in a dependency tree format

luigi.tools.deps_tree.**main**()

luigi.tools.luigi_grep module

class luigi.tools.luigi_grep.**LuigiGrep**(*host*, *port*)

Bases: `object`

graph_url

prefix_search(*job_name_prefix*)

Searches for jobs matching the given `job_name_prefix`.

status_search(*status*)

Searches for jobs matching the given `status`.

luigi.tools.luigi_grep.**main**()

luigi.tools.range module

Produces contiguous completed ranges of recurring tasks.

See `RangeDaily` and `RangeHourly` for basic usage.

Caveat - if gaps accumulate, their causes (e.g. missing dependencies) going unmonitored/unmitigated, then this will eventually keep retrying the same gaps over and over and make no progress to more recent times. (See `task_limit` and `reverse` parameters.) TODO foolproof against that kind of misuse?

class luigi.tools.range.**RangeEvent**

Bases: *`luigi.event.Event`*

Events communicating useful metrics.

`COMPLETE_COUNT` would normally be nondecreasing, and its derivative would describe performance (how many instances complete invocation-over-invocation).

`COMPLETE_FRACTION` reaching 1 would be a telling event in case of a backfill with defined start and stop. Would not be strikingly useful for a typical recurring task without stop defined, fluctuating close to 1.

`DELAY` is measured from the first found missing datehour till (current time + hours_forward), or till stop if it is defined. In hours for Hourly. TBD different units for other frequencies? TODO any different for reverse mode? From first missing till last missing? From last gap till stop?

COMPLETE_COUNT = 'event.tools.range.complete.count'

COMPLETE_FRACTION = 'event.tools.range.complete.fraction'

DELAY = 'event.tools.range.delay'

class luigi.tools.range.**RangeBase**(**args*, ***kwargs*)

Bases: *luigi.task.WrapperTask*

Produces a contiguous completed range of a recurring task.

Made for the common use case where a task is parameterized by e.g. `DateParameter`, and assurance is needed that any gaps arising from downtime are eventually filled.

Emits events that one can use to monitor gaps and delays.

At least one of start and stop needs to be specified.

(This is quite an abstract base class for subclasses with different datetime parameter classes, e.g. `DateParameter`, `DateHourParameter`, . . . , and different parameter naming, e.g. days_back/forward, hours_back/forward, . . . , as well as different documentation wording, to improve user experience.)

Subclasses will need to use the `of` parameter when overriding methods.

of = TaskParameter: task name to be completed. The task must take a single datetime p

of_params = DictParameter (defaults to {}): Arguments to be provided to the 'of' clas

start = Parameter

stop = Parameter

reverse = BoolParameter (defaults to False): specifies the preferred order for catchi

task_limit = IntParameter (defaults to 50): how many of 'of' tasks to require. Guards

now = IntParameter (defaults to None): set to override current time. In seconds since

param_name = Parameter (defaults to None): parameter name used to pass in parameteriz

of_cls

DONT USE. Will be deleted soon. Use `self.of`!

datetime_to_parameter(*dt*)

parameter_to_datetime(*p*)

datetime_to_parameters(*dt*)

Given a date-time, will produce a dictionary of of-params combined with the ranged task parameter

parameters_to_datetime(*p*)

Given a dictionary of parameters, will extract the ranged task parameter value

moving_start(*now*)

Returns a datetime from which to ensure contiguousness in the case when start is None or unfeasibly far back.

moving_stop(*now*)

Returns a datetime till which to ensure contiguousness in the case when stop is None or unfeasibly far forward.

finite_datetimes(*finite_start*, *finite_stop*)

Returns the individual datetimes in interval [finite_start, finite_stop) for which task completeness should be required, as a sorted list.

requires()

The Tasks that this Task depends on.

A Task will only run if all of the Tasks that it requires are completed. If your Task does not require any other Tasks, then you don't need to override this method. Otherwise, a subclass can override this method to return a single Task, a list of Task instances, or a dict whose values are Task instances.

See *Task.requires*

missing_datetimes(*finite_datetimes*)
Override in subclasses to do bulk checks.

Returns a sorted list.

This is a conservative base implementation that brutally checks completeness, instance by instance.

Inadvisable as it may be slow.

class luigi.tools.range.**RangeDailyBase**(**args*, ***kwargs*)
Bases: `luigi.tools.range.RangeBase`

Produces a contiguous completed range of a daily recurring task.

start = DateParameter (defaults to None): beginning date, inclusive. Default: None -

stop = DateParameter (defaults to None): ending date, exclusive. Default: None - worl

days_back = IntParameter (defaults to 100): extent to which contiguousness is to be a

days_forward = IntParameter (defaults to 0): extent to which contiguousness is to be

datetime_to_parameter(*dt*)

parameter_to_datetime(*p*)

datetime_to_parameters(*dt*)
Given a date-time, will produce a dictionary of of-params combined with the ranged task parameter

parameters_to_datetime(*p*)
Given a dictionary of parameters, will extract the ranged task parameter value

moving_start(*now*)
Returns a datetime from which to ensure contiguousness in the case when start is None or unfeasibly far back.

moving_stop(*now*)
Returns a datetime till which to ensure contiguousness in the case when stop is None or unfeasibly far forward.

finite_datetimes(*finite_start*, *finite_stop*)
Simply returns the points in time that correspond to turn of day.

class luigi.tools.range.**RangeHourlyBase**(**args*, ***kwargs*)
Bases: `luigi.tools.range.RangeBase`

Produces a contiguous completed range of an hourly recurring task.

start = DateHourParameter (defaults to None): beginning datehour, inclusive. Default:

stop = DateHourParameter (defaults to None): ending datehour, exclusive. Default: No

hours_back = IntParameter (defaults to 2400): extent to which contiguousness is to be

hours_forward = IntParameter (defaults to 0): extent to which contiguousness is to be

datetime_to_parameter(*dt*)

parameter_to_datetime(*p*)

datetime_to_parameters(*dt*)
Given a date-time, will produce a dictionary of of-params combined with the ranged task parameter

parameters_to_datetime(*p*)
Given a dictionary of parameters, will extract the ranged task parameter value

moving_start(*now*)
Returns a datetime from which to ensure contiguousness in the case when start is None or unfeasibly far back.

moving_stop(*now*)
Returns a datetime till which to ensure contiguousness in the case when stop is None or unfeasibly far forward.

finite_datetimes(*finite_start*, *finite_stop*)
Simply returns the points in time that correspond to whole hours.

class luigi.tools.range.**RangeByMinutesBase**(**args*, ***kwargs*)
Bases: *luigi.tools.range.RangeBase*

Produces a contiguous completed range of an recurring tasks separated a specified number of minutes.

start = DateMinuteParameter (defaults to None): beginning date-hour-minute, inclusive

stop = DateMinuteParameter (defaults to None): ending date-hour-minute, exclusive. De

minutes_back = IntParameter (defaults to 1440): extent to which contiguousness is to

minutes_forward = IntParameter (defaults to 0): extent to which contiguousness is to

minutes_interval = IntParameter (defaults to 1): separation between events in minutes

datetime_to_parameter(*dt*)

parameter_to_datetime(*p*)

datetime_to_parameters(*dt*)
Given a date-time, will produce a dictionary of of-params combined with the ranged task parameter

parameters_to_datetime(*p*)
Given a dictionary of parameters, will extract the ranged task parameter value

moving_start(*now*)
Returns a datetime from which to ensure contiguousness in the case when start is None or unfeasibly far back.

moving_stop(*now*)
Returns a datetime till which to ensure contiguousness in the case when stop is None or unfeasibly far forward.

finite_datetimes(*finite_start*, *finite_stop*)
Simply returns the points in time that correspond to a whole number of minutes intervals.

luigi.tools.range.**most_common**(*items*)
Wanted functionality from Counters (new in Python 2.7).

luigi.tools.range.**infer_bulk_complete_from_fs**(*datetimes*, *datetime_to_task*, *datetime_to_re*)
Efficiently determines missing datetimes by filesystem listing.

The current implementation works for the common case of a task writing output to a `FileSystemTarget` whose path is built using strftime with format like '…%Y…%m…%d…%H…', without custom `complete()` or `exists()`.

(Eventually Luigi could have ranges of completion as first-class citizens. Then this listing business could be factored away/be provided for explicitly in target API or some kind of a history server.)

class luigi.tools.range.**RangeMonthly**(**args*, ***kwargs*)

Bases: `luigi.tools.range.RangeBase`

Produces a contiguous completed range of a monthly recurring task.

Unlike the Range* classes with shorter intervals, this class does not perform bulk optimisation. It is assumed that the number of months is low enough not to motivate the increased complexity. Hence, there is no class RangeMonthlyBase.

start = MonthParameter (defaults to None): beginning month, inclusive. Default: None

stop = MonthParameter (defaults to None): ending month, exclusive. Default: None - w

months_back = IntParameter (defaults to 13): extent to which contiguousness is to be

months_forward = IntParameter (defaults to 0): extent to which contiguousness is to b

datetime_to_parameter(*dt*)

parameter_to_datetime(*p*)

datetime_to_parameters(*dt*)

Given a date-time, will produce a dictionary of of-params combined with the ranged task parameter

parameters_to_datetime(*p*)

Given a dictionary of parameters, will extract the ranged task parameter value

moving_start(*now*)

Returns a datetime from which to ensure contiguousness in the case when start is None or unfeasibly far back.

moving_stop(*now*)

Returns a datetime till which to ensure contiguousness in the case when stop is None or unfeasibly far forward.

finite_datetimes(*finite_start*, *finite_stop*)

Simply returns the points in time that correspond to turn of month.

class luigi.tools.range.**RangeDaily**(**args*, ***kwargs*)

Bases: `luigi.tools.range.RangeDailyBase`

Efficiently produces a contiguous completed range of a daily recurring task that takes a single `DateParameter`.

Falls back to infer it from output filesystem listing to facilitate the common case usage.

Convenient to use even from command line, like:

```
luigi --module your.module RangeDaily --of YourActualTask --start 2014-01-01
```

missing_datetimes(*finite_datetimes*)

Override in subclasses to do bulk checks.

Returns a sorted list.

This is a conservative base implementation that brutally checks completeness, instance by instance.

Inadvisable as it may be slow.

class luigi.tools.range.**RangeHourly**(**args*, ***kwargs*)

Bases: `luigi.tools.range.RangeHourlyBase`

Efficiently produces a contiguous completed range of an hourly recurring task that takes a single `DateHourParameter`.

Benefits from `bulk_complete` information to efficiently cover gaps.

Falls back to infer it from output filesystem listing to facilitate the common case usage.

Convenient to use even from command line, like:

```
luigi --module your.module RangeHourly --of YourActualTask --start 2014-01-01T00
```

`missing_datetimes`(*finite_datetimes*)
Override in subclasses to do bulk checks.

Returns a sorted list.

This is a conservative base implementation that brutally checks completeness, instance by instance.

Inadvisable as it may be slow.

class `luigi.tools.range.`**`RangeByMinutes`**(**args*, ***kwargs*)
Bases: *`luigi.tools.range.RangeByMinutesBase`*

Efficiently produces a contiguous completed range of an recurring task every interval minutes that takes a single `DateMinuteParameter`.

Benefits from `bulk_complete` information to efficiently cover gaps.

Falls back to infer it from output filesystem listing to facilitate the common case usage.

Convenient to use even from command line, like:

```
luigi --module your.module RangeByMinutes --of YourActualTask --start 2014-01-
↪01T0123
```

`missing_datetimes`(*finite_datetimes*)
Override in subclasses to do bulk checks.

Returns a sorted list.

This is a conservative base implementation that brutally checks completeness, instance by instance.

Inadvisable as it may be slow.

Module contents

Sort of a standard library for doing stuff with Tasks at a somewhat abstract level.

Submodule introduced to stop growing util.py unstructured.

9.1.2 Submodules

luigi.batch_notifier module

Library for sending batch notifications from the Luigi scheduler. This module is internal to Luigi and not designed for use in other contexts.

class `luigi.batch_notifier.`**`batch_email`**(**args*, ***kwargs*)
Bases: *`luigi.task.Config`*

`email_interval = IntParameter (defaults to 60): Number of minutes between e-mail send`

batch_mode = ChoiceParameter (defaults to unbatched_params): Method used for batching

error_lines = IntParameter (defaults to 20): Number of lines to show from each error r

error_messages = IntParameter (defaults to 1): Number of error messages to show for ea

group_by_error_messages = BoolParameter (defaults to True): Group items with the same

class luigi.batch_notifier.**ExplQueue**(*num_items*)
Bases: collections.OrderedDict

enqueue(*item*)

class luigi.batch_notifier.**BatchNotifier**(***kwargs*)
Bases: object

add_failure(*task_name*, *family*, *unbatched_args*, *expl*, *owners*)

add_disable(*task_name*, *family*, *unbatched_args*, *owners*)

add_scheduling_fail(*task_name*, *family*, *unbatched_args*, *expl*, *owners*)

send_email()

update()

luigi.cmdline module

luigi.cmdline.**luigi_run**(*argv=['-b', 'latex', '-D', 'language=en', '-d', '_build/doctrees', '.', '_build/latex']*)

luigi.cmdline.**luigid**(*argv=['-b', 'latex', '-D', 'language=en', '-d', '_build/doctrees', '.', '_build/latex']*)

luigi.cmdline_parser module

This module contains luigi internal parsing logic. Things exposed here should be considered internal to luigi.

class luigi.cmdline_parser.**CmdlineParser**(*cmdline_args*)
Bases: object

Helper for parsing command line arguments and used as part of the context when instantiating task objects.

Normal luigi users should just use `luigi.run()`.

Initialize cmd line args

classmethod get_instance()
Singleton getter

classmethod global_instance(***kwds*)
Meant to be used as a context manager.

get_task_obj()
Get the task object

luigi.date_interval module

luigi.date_interval provides convenient classes for date algebra. Everything uses ISO 8601 notation, i.e. YYYY-MM-DD for dates, etc. There is a corresponding `luigi.parameter.DateIntervalParameter` that you can use to parse date intervals.

Example:

```
class MyTask(luigi.Task):
    date_interval = luigi.DateIntervalParameter()
```

Now, you can launch this from the command line using `--date-interval 2014-05-10` or `--date-interval 2014-W26` (using week notation) or `--date-interval 2014` (for a year) and some other notations.

class `luigi.date_interval.`**`DateInterval`**(*date_a*, *date_b*)

Bases: `object`

The *`DateInterval`* is the base class with subclasses *`Date`*, *`Week`*, *`Month`*, *`Year`*, and *`Custom`*. Note that the *`DateInterval`* is abstract and should not be used directly: use *`Custom`* for arbitrary date intervals. The base class features a couple of convenience methods, such as `next()` which returns the next consecutive date interval.

Example:

```
x = luigi.date_interval.Week(2013, 52)
print x.prev()
```

This will print `2014-W01`.

All instances of *`DateInterval`* have attributes `date_a` and `date_b` set. This represents the half open range of the date interval. For instance, a May 2014 is represented as `date_a = 2014-05-01`, `date_b = 2014-06-01`.

`dates`()

Returns a list of dates in this date interval.

`hours`()

Same as dates() but returns 24 times more info: one for each hour.

`prev`()

Returns the preceding corresponding date interval (eg. May -> April).

`next`()

Returns the subsequent corresponding date interval (eg. 2014 -> 2015).

`to_string`()

classmethod **`from_date`**(*d*)

Abstract class method.

For instance, `Month.from_date(datetime.date(2012, 6, 6))` returns a `Month(2012, 6)`.

classmethod **`parse`**(*s*)

Abstract class method.

For instance, `Year.parse("2014")` returns a `Year(2014)`.

class `luigi.date_interval.`**`Date`**(*y*, *m*, *d*)

Bases: *`luigi.date_interval.DateInterval`*

Most simple *`DateInterval`* where `date_b == date_a + datetime.timedelta(1)`.

`to_string`()

classmethod **`from_date`**(*d*)

Abstract class method.

For instance, `Month.from_date(datetime.date(2012, 6, 6))` returns a `Month(2012, 6)`.

classmethod parse(*s*)
Abstract class method.

For instance, `Year.parse("2014")` returns a `Year(2014)`.

class luigi.date_interval.**Week**(*y*, *w*)
Bases: *luigi.date_interval.DateInterval*

ISO 8601 week. Note that it has some counterintuitive behavior around new year. For instance Monday 29 December 2008 is week 2009-W01, and Sunday 3 January 2010 is week 2009-W53 This example was taken from from http://en.wikipedia.org/wiki/ISO_8601#Week_dates

Python datetime does not have a method to convert from ISO weeks, so the constructor uses some stupid brute force

to_string()

classmethod from_date(*d*)
Abstract class method.

For instance, `Month.from_date(datetime.date(2012, 6, 6))` returns a `Month(2012, 6)`.

classmethod parse(*s*)
Abstract class method.

For instance, `Year.parse("2014")` returns a `Year(2014)`.

class luigi.date_interval.**Month**(*y*, *m*)
Bases: *luigi.date_interval.DateInterval*

to_string()

classmethod from_date(*d*)
Abstract class method.

For instance, `Month.from_date(datetime.date(2012, 6, 6))` returns a `Month(2012, 6)`.

classmethod parse(*s*)
Abstract class method.

For instance, `Year.parse("2014")` returns a `Year(2014)`.

class luigi.date_interval.**Year**(*y*)
Bases: *luigi.date_interval.DateInterval*

to_string()

classmethod from_date(*d*)
Abstract class method.

For instance, `Month.from_date(datetime.date(2012, 6, 6))` returns a `Month(2012, 6)`.

classmethod parse(*s*)
Abstract class method.

For instance, `Year.parse("2014")` returns a `Year(2014)`.

class luigi.date_interval.**Custom**(*date_a*, *date_b*)
Bases: *luigi.date_interval.DateInterval*

Custom date interval (does not implement prev and next methods)

Actually the ISO 8601 specifies <start>/<end> as the time interval format Not sure if this goes for date intervals as well. In any case slashes will most likely cause problems with paths etc.

to_string()

classmethod parse(*s*)
Abstract class method.

For instance, `Year.parse("2014")` returns a `Year(2014)`.

luigi.db_task_history module

Provides a database backend to the central scheduler. This lets you see historical runs. See *Enabling Task History* for information about how to turn out the task history feature.

class luigi.db_task_history.**DbTaskHistory**
Bases: *luigi.task_history.TaskHistory*

Task History that writes to a database using sqlalchemy. Also has methods for useful db queries.

CURRENT_SOURCE_VERSION = 1

task_scheduled(*task*)

task_finished(*task*, *successful*)

task_started(*task*, *worker_host*)

find_all_by_parameters(*task_name*, *session=None*, ***task_params*)
Find tasks with the given task_name and the same parameters as the kwargs.

find_all_by_name(*task_name*, *session=None*)
Find all tasks with the given task_name.

find_latest_runs(*session=None*)
Return tasks that have been updated in the past 24 hours.

find_all_runs(*session=None*)
Return all tasks that have been updated.

find_all_events(*session=None*)
Return all running/failed/done events.

find_task_by_id(*id*, *session=None*)
Find task with the given record ID.

class luigi.db_task_history.**TaskParameter**(***kwargs*)
Bases: `sqlalchemy.ext.declarative.api.Base`

Table to track luigi.Parameter()s of a Task.

A simple constructor that allows initialization from kwargs.

Sets attributes on the constructed instance using the names and values in `kwargs`.

Only keys that are present as attributes of the instance's class are allowed. These could be, for example, any mapped columns or relationships.

task_id

name

value

class `luigi.db_task_history.`**`TaskEvent`**(***kwargs*)

Bases: `sqlalchemy.ext.declarative.api.Base`

Table to track when a task is scheduled, starts, finishes, and fails.

A simple constructor that allows initialization from kwargs.

Sets attributes on the constructed instance using the names and values in `kwargs`.

Only keys that are present as attributes of the instance's class are allowed. These could be, for example, any mapped columns or relationships.

`id`

`task_id`

`event_name`

`ts`

class `luigi.db_task_history.`**`TaskRecord`**(***kwargs*)

Bases: `sqlalchemy.ext.declarative.api.Base`

Base table to track information about a luigi.Task.

References to other tables are available through task.events, task.parameters, etc.

A simple constructor that allows initialization from kwargs.

Sets attributes on the constructed instance using the names and values in `kwargs`.

Only keys that are present as attributes of the instance's class are allowed. These could be, for example, any mapped columns or relationships.

`id`

`task_id`

`name`

`host`

`parameters`

`events`

luigi.event module

Definitions needed for events. See *Events and callbacks* for info on how to use it.

class `luigi.event.`**`Event`**

Bases: `object`

`DEPENDENCY_DISCOVERED = 'event.core.dependency.discovered'`

`DEPENDENCY_MISSING = 'event.core.dependency.missing'`

`DEPENDENCY_PRESENT = 'event.core.dependency.present'`

`BROKEN_TASK = 'event.core.task.broken'`

`START = 'event.core.start'`

`PROGRESS = 'event.core.progress'`

This event can be fired by the task itself while running. The purpose is for the task to report progress, metadata or any generic info so that event handler listening for this can keep track of the progress of running task.

FAILURE = 'event.core.failure'

SUCCESS = 'event.core.success'

PROCESSING_TIME = 'event.core.processing_time'

TIMEOUT = 'event.core.timeout'

PROCESS_FAILURE = 'event.core.process_failure'

luigi.execution_summary module

This module provide the function *summary()* that is used for printing an execution summary at the end of luigi invocations.

class luigi.execution_summary.**execution_summary**(**args*, ***kwargs*)
Bases: *luigi.task.Config*

summary_length = IntParameter (defaults to 5)

class luigi.execution_summary.**LuigiStatusCode**
Bases: enum.Enum

All possible status codes for the attribute status in *LuigiRunResult* when the argument detailed_summary=True in *luigi.run() / luigi.build*. Here are the codes and what they mean:

Status Code Name	Meaning
SUCCESS	There were no failed tasks or missing dependencies
SUCCESS_WITH_RETRY	There were failed tasks but they all succeeded in a retry
FAILED	There were failed tasks
FAILED_AND_SCHEDULING_FAILED	There were failed tasks and tasks whose scheduling failed
SCHEDULING_FAILED	There were tasks whose scheduling failed
NOT_RUN	There were tasks that were not granted run permission by the scheduler
MISSING_EXT	There were missing external dependencies

SUCCESS = (':)', 'there were no failed tasks or missing dependencies')

SUCCESS_WITH_RETRY = (':)', 'there were failed tasks but they all succeeded in a retr

FAILED = (':(', 'there were failed tasks')

FAILED_AND_SCHEDULING_FAILED = (':(', 'there were failed tasks and tasks whose schedul

SCHEDULING_FAILED = (':(', 'there were tasks whose scheduling failed')

NOT_RUN = (':|', 'there were tasks that were not granted run permission by the schedul

MISSING_EXT = (':|', 'there were missing external dependencies')

class luigi.execution_summary.**LuigiRunResult**(*worker*, *worker_add_run_status=True*)
Bases: object

The result of a call to build/run when passing the detailed_summary=True argument.

Attributes:

- one_line_summary (str): One line summary of the progress.
- summary_text (str): Detailed summary of the progress.
- status (LuigiStatusCode): Luigi Status Code. See *LuigiStatusCode* for what these codes mean.

- worker (luigi.worker.worker): Worker object. See *worker*.
- scheduling_succeeded (bool): Boolean which is *True* if all the tasks were scheduled without errors.

luigi.execution_summary.**summary**(*worker*)
Given a worker, return a human readable summary of what the worker have done.

luigi.format module

class luigi.format.**FileWrapper**(*file_object*)
Bases: object

Wrap *file* in a "real" so stuff can be added to it after creation.

class luigi.format.**InputPipeProcessWrapper**(*command*, *input_pipe=None*)
Bases: object

Initializes a InputPipeProcessWrapper instance.

Parameters **command** – a subprocess.Popen instance with stdin=input_pipe and stdout=subprocess.PIPE. Alternatively, just its args argument as a convenience.

create_subprocess(*command*)
http://www.chiark.greenend.org.uk/ucgi/~cjwatson/blosxom/2009-07-02-python-sigpipe.html

close()

readable()

writable()

seekable()

class luigi.format.**OutputPipeProcessWrapper**(*command*, *output_pipe=None*)
Bases: object

WRITES_BEFORE_FLUSH = 10000

write(**args*, ***kwargs*)

writeLine(*line*)

close()

abort()

readable()

writable()

seekable()

class luigi.format.**BaseWrapper**(*stream*, **args*, ***kwargs*)
Bases: object

class luigi.format.**NewlineWrapper**(*stream*, *newline=None*)
Bases: *luigi.format.BaseWrapper*

read(*n=-1*)

writelines(*lines*)

write(*b*)

class luigi.format.**MixedUnicodeBytesWrapper**(*stream*, *encoding=None*)
Bases: *luigi.format.BaseWrapper*

write(*b*)

writelines(*lines*)

class luigi.format.**Format**

Bases: `object`

Interface for format specifications.

classmethod pipe_reader(*input_pipe*)

classmethod pipe_writer(*output_pipe*)

class luigi.format.**ChainFormat**(**args*, ***kwargs*)

Bases: *luigi.format.Format*

pipe_reader(*input_pipe*)

pipe_writer(*output_pipe*)

class luigi.format.**TextWrapper**(*stream*, **args*, ***kwargs*)

Bases: `_io.TextIOWrapper`

class luigi.format.**NopFormat**

Bases: *luigi.format.Format*

pipe_reader(*input_pipe*)

pipe_writer(*output_pipe*)

class luigi.format.**WrappedFormat**(**args*, ***kwargs*)

Bases: *luigi.format.Format*

pipe_reader(*input_pipe*)

pipe_writer(*output_pipe*)

class luigi.format.**TextFormat**(**args*, ***kwargs*)

Bases: *luigi.format.WrappedFormat*

input = 'unicode'

output = 'bytes'

wrapper_cls

alias of *TextWrapper*

class luigi.format.**MixedUnicodeBytesFormat**(**args*, ***kwargs*)

Bases: *luigi.format.WrappedFormat*

output = 'bytes'

wrapper_cls

alias of *MixedUnicodeBytesWrapper*

class luigi.format.**NewlineFormat**(**args*, ***kwargs*)

Bases: *luigi.format.WrappedFormat*

input = 'bytes'

output = 'bytes'

wrapper_cls

alias of *NewlineWrapper*

class luigi.format.**GzipFormat**(*compression_level=None*)

Bases: *luigi.format.Format*

input = 'bytes'

output = 'bytes'

pipe_reader(*input_pipe*)

pipe_writer(*output_pipe*)

class luigi.format.**Bzip2Format**

Bases: *luigi.format.Format*

input = 'bytes'

output = 'bytes'

pipe_reader(*input_pipe*)

pipe_writer(*output_pipe*)

luigi.format.**get_default_format**()

luigi.freezing module

Internal-only module with immutable data structures.

Please, do not use it outside of Luigi codebase itself.

class luigi.freezing.**FrozenOrderedDict**(**args*, ***kwargs*)

Bases: `_abcoll.Mapping`

It is an immutable wrapper around ordered dictionaries that implements the complete `collections.Mapping` interface. It can be used as a drop-in replacement for dictionaries where immutability and ordering are desired.

get_wrapped()

luigi.freezing.**recursively_freeze**(*value*)

Recursively walks `Mapping``s and ``list``s and converts them to ``FrozenOrderedDict` and `tuples`, respectively.

luigi.interface module

This module contains the bindings for command line integration and dynamic loading of tasks

If you don't want to run luigi from the command line. You may use the methods defined in this module to programatically run luigi.

class luigi.interface.**core**(**args*, ***kwargs*)

Bases: *luigi.task.Config*

Keeps track of a bunch of environment params.

Uses the internal luigi parameter mechanism. The nice thing is that we can instantiate this class and get an object with all the environment variables set. This is arguably a bit of a hack.

use_cmdline_section = False

local_scheduler = BoolParameter (defaults to False): Use an in-memory central schedul

scheduler_host = Parameter (defaults to localhost): Hostname of machine running remot

scheduler_port = IntParameter (defaults to 8082): Port of remote scheduler api proces

scheduler_url = Parameter (defaults to): Full path to remote scheduler

lock_size = IntParameter (defaults to 1): Maximum number of workers running the same

no_lock = BoolParameter (defaults to False): Ignore if similar process is already run

lock_pid_dir = Parameter (defaults to /tmp/luigi): Directory to store the pid file

take_lock = BoolParameter (defaults to False): Signal other processes to stop getting

workers = IntParameter (defaults to 1): Maximum number of parallel tasks to run

logging_conf_file = Parameter (defaults to): Configuration file for logging

log_level = ChoiceParameter (defaults to DEBUG): Default log level to use when logging

module = Parameter (defaults to): Used for dynamic loading of modules

parallel_scheduling = BoolParameter (defaults to False): Use multiprocessing to do sc

parallel_scheduling_processes = IntParameter (defaults to 0): The number of processes

assistant = BoolParameter (defaults to False): Run any task from the scheduler.

help = BoolParameter (defaults to False): Show most common flags and all task-specifi

help_all = BoolParameter (defaults to False): Show all command line flags

exception luigi.interface.**PidLockAlreadyTakenExit**
Bases: exceptions.SystemExit

The exception thrown by *luigi.run()*, when the lock file is inaccessible

luigi.interface.**run**(**args*, ***kwargs*)
Please dont use. Instead use *luigi* binary.

Run from cmdline using argparse.

Parameters use_dynamic_argparse – Deprecated and ignored

luigi.interface.**build**(*tasks*, *worker_scheduler_factory=None*, *detailed_summary=False*, ***env_params*)
Run internally, bypassing the cmdline parsing.

Useful if you have some luigi code that you want to run internally. Example:

```
luigi.build([MyTask1(), MyTask2()], local_scheduler=True)
```

One notable difference is that *build* defaults to not using the identical process lock. Otherwise, *build* would only be callable once from each process.

Parameters

- **tasks** –
- **worker_scheduler_factory** –
- **env_params** –

Returns True if there were no scheduling errors, even if tasks may fail.

luigi.local_target module

LocalTarget provides a concrete implementation of a *Target* class that uses files on the local file system

class luigi.local_target.**atomic_file**(*path*)
Bases: *luigi.target.AtomicLocalFile*

Simple class that writes to a temp file and moves it on close() Also cleans up the temp file if close is not invoked

move_to_final_destination()

generate_tmp_path(*path*)

class luigi.local_target.**LocalFileSystem**

Bases: *luigi.target.FileSystem*

Wrapper for access to file system operations.

Work in progress - add things as needed.

copy(*old_path*, *new_path*, *raise_if_exists=False*)

Copy a file or a directory with contents. Currently, LocalFileSystem and MockFileSystem support only single file copying but S3Client copies either a file or a directory as required.

exists(*path*)

Return `True` if file or directory at `path` exist, `False` otherwise

Parameters **path** (*str*) – a path within the FileSystem to check for existence.

mkdir(*path*, *parents=True*, *raise_if_exists=False*)

Create directory at location `path`

Creates the directory at `path` and implicitly create parent directories if they do not already exist.

Parameters

- **path** (*str*) – a path within the FileSystem to create as a directory.
- **parents** (*bool*) – Create parent directories when necessary. When parents=False and the parent directory doesn't exist, raise luigi.target.MissingParentDirectory
- **raise_if_exists** (*bool*) – raise luigi.target.FileAlreadyExists if the folder already exists.

isdir(*path*)

Return `True` if the location at `path` is a directory. If not, return `False`.

Parameters **path** (*str*) – a path within the FileSystem to check as a directory.

Note: This method is optional, not all FileSystem subclasses implements it.

listdir(*path*)

Return a list of files rooted in path.

This returns an iterable of the files rooted at `path`. This is intended to be a recursive listing.

Parameters **path** (*str*) – a path within the FileSystem to list.

Note: This method is optional, not all FileSystem subclasses implements it.

remove(*path*, *recursive=True*)

Remove file or directory at location `path`

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

move(*old_path*, *new_path*, *raise_if_exists=False*)

Move file atomically. If source and destination are located on different filesystems, atomicity is approximated but cannot be guaranteed.

rename_dont_move (*path*, *dest*)
Rename `path` to `dest`, but don't move it into the `dest` folder (if it is a folder). This method is just a wrapper around the `move` method of LocalTarget.

class `luigi.local_target.`**LocalTarget** (*path=None*, *format=None*, *is_tmp=False*)
Bases: *luigi.target.FileSystemTarget*

fs = <luigi.local_target.LocalFileSystem object>

makedirs ()
Create all parent folders if they do not exist.

open (*mode='r'*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters mode (`str`) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

move (*new_path*, *raise_if_exists=False*)

move_dir (*new_path*)

remove ()
Remove the resource at the path specified by this FileSystemTarget.

This method is implemented by using *fs*.

copy (*new_path*, *raise_if_exists=False*)

fn

luigi.lock module

Locking functionality when launching things from the command line. Uses a pidfile. This prevents multiple identical workflows to be launched simultaneously.

`luigi.lock.`**getpcmd** (*pid*)
Returns command of process.

Parameters pid –

`luigi.lock.`**get_info** (*pid_dir*, *my_pid=None*)

`luigi.lock.`**acquire_for** (*pid_dir*, *num_available=1*, *kill_signal=None*)
Makes sure the process is only run once at the same time with the same name.

Notice that we since we check the process name, different parameters to the same command can spawn multiple processes at the same time, i.e. running "/usr/bin/my_process" does not prevent anyone from launching "/usr/bin/my_process –foo bar".

luigi.metrics module

class `luigi.metrics.`**MetricsCollectors**
Bases: `enum.Enum`

default = 1

none = 1

datadog = 2

prometheus = 3

get = <bound method EnumMeta.get of <enum 'MetricsCollectors'>>

class luigi.metrics.**MetricsCollector**

Bases: `object`

Abstractable MetricsCollector base class that can be replace by tool specific implementation.

handle_task_started(*task*)

handle_task_failed(*task*)

handle_task_disabled(*task*, *config*)

handle_task_done(*task*)

generate_latest()

configure_http_handler(*http_handler*)

class luigi.metrics.**NoMetricsCollector**

Bases: *luigi.metrics.MetricsCollector*

Empty MetricsCollector when no collector is being used

handle_task_started(*task*)

handle_task_failed(*task*)

handle_task_disabled(*task*, *config*)

handle_task_done(*task*)

luigi.mock module

This module provides a class *MockTarget*, an implementation of *Target*. *MockTarget* contains all data in-memory. The main purpose is unit testing workflows without writing to disk.

class luigi.mock.**MockFileSystem**

Bases: *luigi.target.FileSystem*

MockFileSystem inspects/modifies _data to simulate file system operations.

copy(*path*, *dest*, *raise_if_exists=False*)

Copies the contents of a single file path to dest

get_all_data()

get_data(*fn*)

exists(*path*)

Return `True` if file or directory at `path` exist, `False` otherwise

Parameters path (`str`) – a path within the FileSystem to check for existence.

remove(*path*, *recursive=True*, *skip_trash=True*)

Removes the given mockfile. skip_trash doesn't have any meaning.

move(*path*, *dest*, *raise_if_exists=False*)

Moves a single file from path to dest

listdir(*path*)

listdir does a prefix match of self.get_all_data(), but doesn't yet support globs.

isdir(*path*)
Return `True` if the location at `path` is a directory. If not, return `False`.

Parameters **path** (*str*) – a path within the FileSystem to check as a directory.

Note: This method is optional, not all FileSystem subclasses implements it.

mkdir(*path*, *parents=True*, *raise_if_exists=False*)
mkdir is a noop.

clear()

class luigi.mock.**MockTarget**(*fn*, *is_tmp=None*, *mirror_on_stderr=False*, *format=None*)
Bases: *luigi.target.FileSystemTarget*

fs = <luigi.mock.MockFileSystem object>

exists()
Returns `True` if the path for this FileSystemTarget exists; `False` otherwise.

This method is implemented by using *fs*.

move(*path*, *raise_if_exists=False*)
Call MockFileSystem's move command

rename(**args*, ***kwargs*)
Call move to rename self

open(*mode='r'*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters **mode** (*str*) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

luigi.notifications module

Supports sending emails when tasks fail.

This needs some more documentation. See *Configuration* for configuration options. In particular using the config *receiver* should set up Luigi so that it will send emails when tasks fail.

```
[email]
receiver=foo@bar.baz
```

class luigi.notifications.**TestNotificationsTask**(**args*, ***kwargs*)
Bases: *luigi.task.Task*

You may invoke this task to quickly check if you correctly have setup your notifications Configuration. You can run:

```
$ luigi TestNotificationsTask --local-scheduler --email-force-send
```

And then check your email inbox to see if you got an error email or any other kind of notifications that you expected.

raise_in_complete = BoolParameter (defaults to False): If true, fail in complete() in

run()
The task run method, to be overridden in a subclass.

See *Task.run*

complete()
If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

class luigi.notifications.**email**(**args*, ***kwargs*)
Bases: *luigi.task.Config*

force_send = BoolParameter (defaults to False): Send e-mail even from a tty

format = ChoiceParameter (defaults to plain): Format type for sent e-mails Choices:

method = ChoiceParameter (defaults to smtp): Method for sending e-mail Choices: {ses

prefix = Parameter (defaults to): Prefix for subject lines of all e-mails

receiver = Parameter (defaults to): Address to send error e-mails to

sender = Parameter (defaults to luigi-client@build-11151103-project-12134-luigi): Add

class luigi.notifications.**smtp**(**args*, ***kwargs*)
Bases: *luigi.task.Config*

host = Parameter (defaults to localhost): Hostname of smtp server

local_hostname = Parameter (defaults to None): If specified, local_hostname is used a

no_tls = BoolParameter (defaults to False): Do not use TLS in SMTP connections

password = Parameter (defaults to None): Password for the SMTP server login

port = IntParameter (defaults to 0): Port number for smtp server

ssl = BoolParameter (defaults to False): Use SSL for the SMTP connection.

timeout = FloatParameter (defaults to 10.0): Number of seconds before timing out the

username = Parameter (defaults to None): Username used to log in to the SMTP host

class luigi.notifications.**sendgrid**(**args*, ***kwargs*)
Bases: *luigi.task.Config*

apikey = Parameter: API key for SendGrid login

luigi.notifications.**generate_email**(*sender*, *subject*, *message*, *recipients*, *image_png*)

luigi.notifications.**wrap_traceback**(*traceback*)
For internal use only (until further notice)

luigi.notifications.**send_email_smtp**(*sender*, *subject*, *message*, *recipients*, *image_png*)

luigi.notifications.**send_email_ses**(*sender*, *subject*, *message*, *recipients*, *image_png*)
Sends notification through AWS SES.

Does not handle access keys. Use either 1/ configuration file 2/ EC2 instance profile

See also https://boto3.readthedocs.io/en/latest/guide/configuration.html.

luigi.notifications.**send_email_sendgrid**(*sender*, *subject*, *message*, *recipients*, *image_png*)

luigi.notifications.**send_email_sns**(*sender*, *subject*, *message*, *topic_ARN*, *image_png*)
Sends notification through AWS SNS. Takes Topic ARN from recipients.

Does not handle access keys. Use either 1/ configuration file 2/ EC2 instance profile

See also https://boto3.readthedocs.io/en/latest/guide/configuration.html.

`luigi.notifications.`**`send_email`**(*subject*, *message*, *sender*, *recipients*, *image_png=None*)

Decides whether to send notification. Notification is cancelled if there are no recipients or if stdout is onto tty or if in debug mode.

Dispatches on config value email.method. Default is 'smtp'.

`luigi.notifications.`**`send_error_email`**(*subject*, *message*, *additional_recipients=None*)

Sends an email to the configured error email, if it's configured.

`luigi.notifications.`**`format_task_error`**(*headline*, *task*, *command*, *formatted_exception=None*)

Format a message body for an error email related to a luigi.task.Task

Parameters

- **`headline`** – Summary line for the message
- **`task`** – *luigi.task.Task* instance where this error occurred
- **`formatted_exception`** – optional string showing traceback

Returns message body

luigi.parameter module

Parameters are one of the core concepts of Luigi. All Parameters sit on `Task` classes. See *Parameter* for more info on how to define parameters.

`class` `luigi.parameter.`**`ParameterVisibility`**

Bases: `enum.IntEnum`

Possible values for the parameter visibility option. Public is the default. See *Parameters* for more info.

`PUBLIC = 0`

`HIDDEN = 1`

`PRIVATE = 2`

`has_value = <bound method EnumMeta.has_value of <enum 'ParameterVisibility'>>`

`serialize`()

`exception` `luigi.parameter.`**`ParameterException`**

Bases: `exceptions.Exception`

Base exception.

`exception` `luigi.parameter.`**`MissingParameterException`**

Bases: *`luigi.parameter.ParameterException`*

Exception signifying that there was a missing Parameter.

`exception` `luigi.parameter.`**`UnknownParameterException`**

Bases: *`luigi.parameter.ParameterException`*

Exception signifying that an unknown Parameter was supplied.

`exception` `luigi.parameter.`**`DuplicateParameterException`**

Bases: *`luigi.parameter.ParameterException`*

Exception signifying that a Parameter was specified multiple times.

class `luigi.parameter.`**`Parameter`**(*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: `object`

Parameter whose value is a `str`, and a base class for other parameter types.

Parameters are objects set on the Task class level to make it possible to parameterize tasks. For instance:

```
class MyTask(luigi.Task):
    foo = luigi.Parameter()

class RequiringTask(luigi.Task):
    def requires(self):
        return MyTask(foo="hello")

    def run(self):
        print(self.requires().foo)  # prints "hello"
```

This makes it possible to instantiate multiple tasks, eg `MyTask(foo='bar')` and `MyTask(foo='baz')`. The task will then have the `foo` attribute set appropriately.

When a task is instantiated, it will first use any argument as the value of the parameter, eg. if you instantiate `a = TaskA(x=44)` then `a.x == 44`. When the value is not provided, the value will be resolved in this order of falling priority:

- Any value provided on the command line:
  - To the root task (eg. `--param xyz`)
  - Then to the class, using the qualified task name syntax (eg. `--TaskA-param xyz`).
- With `[TASK_NAME]>PARAM_NAME: <serialized value>` syntax. See *Parameters from config Ingestion*
- Any default value set using the `default` flag.

Parameter objects may be reused, but you must then set the `positional=False` flag.

Parameters

- **`default`** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **`significant`** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **`description`** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **`config_path`** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **`positional`** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.

- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

has_task_value(*task_name*, *param_name*)

task_value(*task_name*, *param_name*)

parse(*x*)
Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

serialize(*x*)
Opposite of `parse()`.

Converts the value `x` to a string.

Parameters **x** – the value to serialize.

normalize(*x*)
Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

next_in_enumeration(*_value*)
If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the `luigi.execution_summary` module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **value** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

class luigi.parameter.**OptionalParameter**(*default=<object object>*, *is_global=False*, *significant=True*, *description=None*, *config_path=None*, *positional=True*, *always_in_help=False*, *batch_method=None*, *visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: `luigi.parameter.Parameter`

A Parameter that treats empty string as None

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.

- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

serialize(*x*)
Opposite of *parse()*.

Converts the value `x` to a string.

Parameters **x** – the value to serialize.

parse(*x*)
Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

class luigi.parameter.**DateParameter**(*interval=1*, *start=None*, ***kwargs*)
Bases: `luigi.parameter._DateParameterBase`

Parameter whose value is a `date`.

A DateParameter is a Date string formatted `YYYY-MM-DD`. For example, `2013-07-10` specifies July 10, 2013.

DateParameters are 90% of the time used to be interpolated into file system paths or the like. Here is a gentle reminder of how to interpolate date parameters into strings:

```
class MyTask(luigi.Task):
    date = luigi.DateParameter()

    def run(self):
        templated_path = "/my/path/to/my/dataset/{date:%Y/%m/%d}/"
        instantiated_path = templated_path.format(date=self.date)
        # print(instantiated_path) --> /my/path/to/my/dataset/2016/06/09/
        # ... use instantiated_path ...
```

To set this parameter to default to the current day. You can write code like this:

```
import datetime

class MyTask(luigi.Task):
    date = luigi.DateParameter(default=datetime.date.today())
```

date_format = '%Y-%m-%d'

next_in_enumeration(*value*)

If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *luigi.execution_summary* module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **value** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

normalize(*value*)

Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

class luigi.parameter.**MonthParameter**(*interval=1*, *start=None*, ***kwargs*)

Bases: *luigi.parameter.DateParameter*

Parameter whose value is a `date`, specified to the month (day of `date` is "rounded" to first of the month).

A MonthParameter is a Date string formatted `YYYY-MM`. For example, `2013-07` specifies July of 2013. Task objects constructed from code accept `date` (ignoring the day value) or *Month*.

date_format = '%Y-%m'

next_in_enumeration(*value*)

If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *luigi.execution_summary* module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **value** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

normalize(*value*)

Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

class luigi.parameter.**YearParameter**(*interval=1*, *start=None*, ***kwargs*)

Bases: *luigi.parameter.DateParameter*

Parameter whose value is a `date`, specified to the year (day and month of `date` is "rounded" to first day of the year).

A YearParameter is a Date string formatted `YYYY`. Task objects constructed from code accept `date` (ignoring the month and day values) or *`Year`*.

`date_format = '%Y'`

`next_in_enumeration`(*value*)

If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *`luigi.execution_summary`* module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **`value`** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

`normalize`(*value*)

Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

`class` `luigi.parameter.`**`DateHourParameter`**(*interval=1*, *start=None*, ***kwargs*)

Bases: `luigi.parameter._DatetimeParameterBase`

Parameter whose value is a `datetime` specified to the hour.

A DateHourParameter is a ISO 8601 formatted date and time specified to the hour. For example, `2013-07-10T19` specifies July 10, 2013 at 19:00.

`date_format = '%Y-%m-%dT%H'`

`class` `luigi.parameter.`**`DateMinuteParameter`**(*interval=1*, *start=None*, ***kwargs*)

Bases: `luigi.parameter._DatetimeParameterBase`

Parameter whose value is a `datetime` specified to the minute.

A DateMinuteParameter is a ISO 8601 formatted date and time specified to the minute. For example, `2013-07-10T1907` specifies July 10, 2013 at 19:07.

The interval parameter can be used to clamp this parameter to every N minutes, instead of every minute.

`date_format = '%Y-%m-%dT%H%M'`

`deprecated_date_format = '%Y-%m-%dT%HH%M'`

`parse`(*s*)

Parses a string to a `datetime`.

`class` `luigi.parameter.`**`DateSecondParameter`**(*interval=1*, *start=None*, ***kwargs*)

Bases: `luigi.parameter._DatetimeParameterBase`

Parameter whose value is a `datetime` specified to the second.

A DateSecondParameter is a ISO 8601 formatted date and time specified to the second. For example, `2013-07-10T190738` specifies July 10, 2013 at 19:07:38.

The interval parameter can be used to clamp this parameter to every N seconds, instead of every second.

`date_format = '%Y-%m-%dT%H%M%S'`

class `luigi.parameter.`**`IntParameter`**(*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *`luigi.parameter.Parameter`*

Parameter whose value is an `int`.

Parameters

- **`default`** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **`significant`** (*`bool`*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **`description`** (*`str`*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **`config_path`** (*`dict`*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **`positional`** (*`bool`*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **`always_in_help`** (*`bool`*) – For the –help option in the command line parsing. Set true to always show in –help.
- **`batch_method`** (*`function(iterable[A])->A`*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **`visibility`** – A Parameter whose value is a *`ParameterVisibility`*. Default value is ParameterVisibility.PUBLIC

`parse`(*s*)

Parses an `int` from the string using `int()`.

`next_in_enumeration`(*value*)

If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *`luigi.execution_summary`* module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **`value`** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

class `luigi.parameter.`**`FloatParameter`**(*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *`luigi.parameter.Parameter`*

Parameter whose value is a `float`.

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

parse(*s*)
Parses a `float` from the string using `float()`.

class luigi.parameter.**BoolParameter**(**args*, ***kwargs*)
Bases: *luigi.parameter.Parameter*

A Parameter whose value is a `bool`. This parameter has an implicit default value of `False`. For the command line interface this means that the value is `False` unless you add `"--the-bool-parameter"` to your command without giving a parameter value. This is considered *implicit* parsing (the default). However, in some situations one might want to give the explicit bool value (`"--the-bool-parameter true|false"`), e.g. when you configure the default value to be `True`. This is called *explicit* parsing. When omitting the parameter value, it is still considered `True` but to avoid ambiguities during argument parsing, make sure to always place bool parameters behind the task family on the command line when using explicit parsing.

You can toggle between the two parsing modes on a per-parameter base via

```
class MyTask(luigi.Task):
    implicit_bool = luigi.BoolParameter(parsing=luigi.BoolParameter.IMPLICIT_
↪PARSING)
    explicit_bool = luigi.BoolParameter(parsing=luigi.BoolParameter.EXPLICIT_
↪PARSING)
```

or globally by

```
luigi.BoolParameter.parsing = luigi.BoolParameter.EXPLICIT_PARSING
```

for all bool parameters instantiated after this line.

IMPLICIT_PARSING = 'implicit'

EXPLICIT_PARSING = 'explicit'

parsing = 'implicit'

parse(*val*)
Parses a `bool` from the string, matching 'true' or 'false' ignoring case.

normalize(*value*)
Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

class luigi.parameter.**DateIntervalParameter**(*default=<object object>*, *is_global=False*, *significant=True*, *description=None*, *config_path=None*, *positional=True*, *always_in_help=False*, *batch_method=None*, *visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *luigi.parameter.Parameter*

A Parameter whose value is a *DateInterval*.

Date Intervals are specified using the ISO 8601 date notation for dates (eg. "2015-11-04"), months (eg. "2015-05"), years (eg. "2015"), or weeks (eg. "2015-W35"). In addition, it also supports arbitrary date intervals provided as two dates separated with a dash (eg. "2015-11-04-2015-12-04").

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.

- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a `ParameterVisibility`. Default value is ParameterVisibility.PUBLIC

parse(*s*)
Parses a `DateInterval` from the input.

see ***luigi.date_interval*** for details on the parsing of DateIntervals.

class luigi.parameter.**TimeDeltaParameter**(*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: `luigi.parameter.Parameter`

Class that maps to timedelta using strings in any of the following forms:

- **n {w[eek[s]]|d[ay[s]]|h[our[s]]|m[inute[s]|s[second[s]]} (e.g. "1 week 2 days" or "1 h")**
  Note: multiple arguments must be supplied in longest to shortest unit order
- ISO 8601 duration `PnDTnHnMnS` (each field optional, years and months not supported)
- ISO 8601 duration `PnW`

See https://en.wikipedia.org/wiki/ISO_8601#Durations

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a `ParameterVisibility`. Default value is ParameterVisibility.PUBLIC

parse (*input*)
Parses a time delta from the input.

See *TimeDeltaParameter* for details on supported formats.

serialize (*x*)
Converts datetime.timedelta to a string

Parameters x – the value to serialize.

class luigi.parameter.**TaskParameter** (*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *luigi.parameter.Parameter*

A parameter that takes another luigi task class.

When used programatically, the parameter should be specified directly with the *luigi.task.Task* (sub) class. Like `MyMetaTask(my_task_param=my_tasks.MyTask)`. On the command line, you specify the *luigi.task.Task.get_task_family()*. Like

```
$ luigi --module my_tasks MyMetaTask --my_task_param my_namespace.MyTask
```

Where `my_namespace.MyTask` is defined in the `my_tasks` python module.

When the *luigi.task.Task* class is instantiated to an object. The value will always be a task class (and not a string).

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

parse(*input*)
Parse a task_famly using the *Register*

serialize(*cls*)
Converts the *luigi.task.Task* (sub) class to its family name.

class luigi.parameter.**EnumParameter**(**args*, ***kwargs*)
Bases: *luigi.parameter.Parameter*

A parameter whose value is an `Enum`.

In the task definition, use

```
class Model(enum.Enum):
  Honda = 1
  Volvo = 2

class MyTask(luigi.Task):
  my_param = luigi.EnumParameter(enum=Model)
```

At the command line, use,

```
$ luigi --module my_tasks MyTask --my-param Honda
```

parse(*s*)
Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters x (*str*) – the value to parse.

Returns the parsed value.

serialize(*e*)
Opposite of *parse()*.

Converts the value `x` to a string.

Parameters x – the value to serialize.

class luigi.parameter.**EnumListParameter**(**args*, ***kwargs*)
Bases: *luigi.parameter.Parameter*

A parameter whose value is a comma-separated list of `Enum`. Values should come from the same enum.

Values are taken to be a list, i.e. order is preserved, duplicates may occur, and empty list is possible.

In the task definition, use

```
class Model(enum.Enum):
  Honda = 1
  Volvo = 2

class MyTask(luigi.Task):
  my_param = luigi.EnumListParameter(enum=Model)
```

At the command line, use,

```
$ luigi --module my_tasks MyTask --my-param Honda,Volvo
```

parse(*s*)
Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

serialize(*enum_values*)
Opposite of `parse()`.

Converts the value `x` to a string.

Parameters **x** – the value to serialize.

class luigi.parameter.**DictParameter**(*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: `luigi.parameter.Parameter`

Parameter whose value is a `dict`.

In the task definition, use

```
class MyTask(luigi.Task):
  tags = luigi.DictParameter()

    def run(self):
        logging.info("Find server with role: %s", self.tags['role'])
        server = aws.ec2.find_my_resource(self.tags)
```

At the command line, use

```
$ luigi --module my_tasks MyTask --tags <JSON string>
```

Simple example with two tags:

```
$ luigi --module my_tasks MyTask --tags '{"role": "web", "env": "staging"}'
```

It can be used to define dynamic parameters, when you do not know the exact list of your parameters (e.g. list of tags, that are dynamically constructed outside Luigi), or you have a complex parameter containing logically related values (like a database connection config).

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.

- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

normalize(*value*)
Ensure that dictionary parameter is converted to a FrozenOrderedDict so it can be hashed.

parse(*source*)
Parses an immutable and ordered `dict` from a JSON string using standard JSON library.

We need to use an immutable dictionary, to create a hashable parameter and also preserve the internal structure of parsing. The traversal order of standard `dict` is undefined, which can result various string representations of this parameter, and therefore a different task id for the task containing this parameter. This is because task id contains the hash of parameters' JSON representation.

Parameters **s** – String to be parse

serialize(*x*)
Opposite of *parse()*.

Converts the value `x` to a string.

Parameters **x** – the value to serialize.

class luigi.parameter.**ListParameter**(*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)
Bases: *luigi.parameter.Parameter*

Parameter whose value is a `list`.

In the task definition, use

```
class MyTask(luigi.Task):
  grades = luigi.ListParameter()

    def run(self):
        sum = 0
        for element in self.grades:
            sum += element
        avg = sum / len(self.grades)
```

At the command line, use

```
$ luigi --module my_tasks MyTask --grades <JSON string>
```

Simple example with two grades:

```
$ luigi --module my_tasks MyTask --grades '[100,70]'
```

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

normalize(*x*)

Ensure that struct is recursively converted to a tuple so it can be hashed.

Parameters x (*str*) – the value to parse.

Returns the normalized (hashable/immutable) value.

parse(*x*)

Parse an individual value from the input.

Parameters x (*str*) – the value to parse.

Returns the parsed value.

serialize(*x*)

Opposite of *parse()*.

Converts the value `x` to a string.

Parameters x – the value to serialize.

class luigi.parameter.**TupleParameter**(*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *luigi.parameter.ListParameter*

Parameter whose value is a `tuple` or `tuple` of tuples.

In the task definition, use

```
class MyTask(luigi.Task):
  book_locations = luigi.TupleParameter()

    def run(self):
        for location in self.book_locations:
            print("Go to page %d, line %d" % (location[0], location[1]))
```

At the command line, use

```
$ luigi --module my_tasks MyTask --book_locations <JSON string>
```

Simple example with two grades:

```
$ luigi --module my_tasks MyTask --book_locations '((12,3),(4,15),(52,1))'
```

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

parse(*x*)

Parse an individual value from the input.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

class luigi.parameter.**NumericalParameter**(*left_op=<built-in function le>*, *right_op=<built-in function lt>*, *args, **kwargs)

Bases: *luigi.parameter.Parameter*

Parameter whose value is a number of the specified type, e.g. `int` or `float` and in the range specified.

In the task definition, use

```
class MyTask(luigi.Task):
    my_param_1 = luigi.NumericalParameter(
        var_type=int, min_value=-3, max_value=7) # -3 <= my_param_1 < 7
    my_param_2 = luigi.NumericalParameter(
        var_type=int, min_value=-3, max_value=7, left_op=operator.lt, right_
↪op=operator.le) # -3 < my_param_2 <= 7
```

At the command line, use

```
$ luigi --module my_tasks MyTask --my-param-1 -3 --my-param-2 -2
```

Parameters

- **var_type** (*function*) – The type of the input variable, e.g. int or float.
- **min_value** – The minimum value permissible in the accepted values range. May be inclusive or exclusive based on left_op parameter. This should be the same type as var_type.
- **max_value** – The maximum value permissible in the accepted values range. May be inclusive or exclusive based on right_op parameter. This should be the same type as var_type.
- **left_op** (*function*) – The comparison operator for the left-most comparison in the expression `min_value left_op value right_op value`. This operator should generally be either `operator.lt` or `operator.le`. Default: `operator.le`.
- **right_op** (*function*) – The comparison operator for the right-most comparison in the expression `min_value left_op value right_op value`. This operator should generally be either `operator.lt` or `operator.le`. Default: `operator.lt`.

parse (*s*)

Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

class luigi.parameter.**ChoiceParameter** (*var_type=<type 'str'>*, **args*, ***kwargs*)

Bases: *luigi.parameter.Parameter*

A parameter which takes two values:

1. an instance of `Iterable` and
2. the class of the variables to convert to.

In the task definition, use

```
class MyTask(luigi.Task):
    my_param = luigi.ChoiceParameter(choices=[0.1, 0.2, 0.3], var_type=float)
```

At the command line, use

```
$ luigi --module my_tasks MyTask --my-param 0.1
```

Consider using *EnumParameter* for a typed, structured alternative. This class can perform the same role when all choices are the same type and transparency of parameter value on the command line is desired.

Parameters

- **var_type** (*function*) – The type of the input variable, e.g. str, int, float, etc. Default: str
- **choices** – An iterable, all of whose elements are of *var_type* to restrict parameter choices to.

parse(*s*)

Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters x (*str*) – the value to parse.

Returns the parsed value.

normalize(*var*)

Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

luigi.process module

Contains some helper functions to run luigid in daemon mode

`luigi.process.`**check_pid**(*pidfile*)

`luigi.process.`**write_pid**(*pidfile*)

`luigi.process.`**get_log_format**()

`luigi.process.`**get_spool_handler**(*filename*)

`luigi.process.`**daemonize**(*cmd, pidfile=None, logdir=None, api_port=8082, address=None, unix_socket=None*)

luigi.retcodes module

Module containing the logic for exit codes for the luigi binary. It's useful when you in a programmatic way need to know if luigi actually finished the given task, and if not why.

class `luigi.retcodes.`**retcode**(**args, **kwargs*)

Bases: *luigi.task.Config*

See the *return codes configuration section*.

unhandled_exception = IntParameter (defaults to 4): For internal luigi errors.

missing_data = IntParameter (defaults to 0): For when there are incomplete ExternalTa

task_failed = IntParameter (defaults to 0): For when a task's run() method fails.

already_running = IntParameter (defaults to 0): For both local --lock and luigid "loc

scheduling_error = IntParameter (defaults to 0): For when a task's complete() or requ

not_run = IntParameter (defaults to 0): For when a task is not granted run permission

luigi.retcodes.**run_with_retcodes**(*argv*)

Run luigi with command line parsing, but raise `SystemExit` with the configured exit code.

Note: Usually you use the luigi binary directly and don't call this function yourself.

Parameters **argv** – Should (conceptually) be `sys.argv[1:]`

luigi.rpc module

Implementation of the REST interface between the workers and the server. rpc.py implements the client side of it, server.py implements the server side. See *Using the Central Scheduler* for more info.

exception luigi.rpc.**RPCError**(*message*, *sub_exception=None*)

Bases: `exceptions.Exception`

class luigi.rpc.**URLLibFetcher**

Bases: `object`

raises = (<class 'urllib2.URLError'>, <class 'socket.timeout'>)

fetch(*full_url*, *body*, *timeout*)

class luigi.rpc.**RequestsFetcher**(*session*)

Bases: `object`

check_pid()

fetch(*full_url*, *body*, *timeout*)

class luigi.rpc.**RemoteScheduler**(*url='http://localhost:8082/'*, *connect_timeout=None*)

Bases: `object`

Scheduler proxy object. Talks to a RemoteSchedulerResponder.

add_scheduler_message_response(**args*, ***kwargs*)

add_task(**args*, ***kwargs*)

- add task identified by task_id if it doesn't exist
- if deps is not None, update dependency list
- update status of task
- add additional workers/stakeholders
- update priority when needed

add_task_batcher(**args*, ***kwargs*)

add_worker(**args*, ***kwargs*)

announce_scheduling_failure(**args*, ***kwargs*)

count_pending(**args*, ***kwargs*)

decrease_running_task_resources(**args*, ***kwargs*)

dep_graph(**args*, ***kwargs*)

disable_worker(**args*, ***kwargs*)

fetch_error(**args*, ***kwargs*)

forgive_failures(**args*, ***kwargs*)

get_running_task_resources(**args*, ***kwargs*)

get_scheduler_message_response (**args, **kwargs*)

get_task_progress_percentage (**args, **kwargs*)

get_task_status_message (**args, **kwargs*)

get_work (**args, **kwargs*)

graph (**args, **kwargs*)

has_task_history (**args, **kwargs*)

inverse_dep_graph (**args, **kwargs*)

is_pause_enabled (**args, **kwargs*)

is_paused (**args, **kwargs*)

mark_as_done (**args, **kwargs*)

pause (**args, **kwargs*)

ping (**args, **kwargs*)

prune (**args, **kwargs*)

re_enable_task (**args, **kwargs*)

resource_list (**args, **kwargs*)
Resources usage info and their consumers (tasks).

send_scheduler_message (**args, **kwargs*)

set_task_progress_percentage (**args, **kwargs*)

set_task_status_message (**args, **kwargs*)

set_worker_processes (**args, **kwargs*)

task_list (**args, **kwargs*)
Query for a subset of tasks by status.

task_search (**args, **kwargs*)
Query for a subset of tasks by task_id.

Parameters **task_str** –

Returns

unpause (**args, **kwargs*)

update_metrics_task_started (**args, **kwargs*)

update_resource (**args, **kwargs*)

update_resources (**args, **kwargs*)

worker_list (**args, **kwargs*)

luigi.scheduler module

The system for scheduling tasks and executing them in order. Deals with dependencies, priorities, resources, etc. The *Worker* pulls tasks from the scheduler (usually over the REST interface) and executes them. See *Using the Central Scheduler* for more info.

luigi.scheduler.**UPSTREAM_SEVERITY_KEY**()
T.index(value, [start, [stop]]) -> integer – return first index of value. Raises ValueError if the value is not present.

class luigi.scheduler.**RetryPolicy**(*retry_count*, *disable_hard_timeout*, *disable_window*)
Bases: `tuple`

Create new instance of RetryPolicy(retry_count, disable_hard_timeout, disable_window)

disable_hard_timeout
Alias for field number 1

disable_window
Alias for field number 2

retry_count
Alias for field number 0

luigi.scheduler.**rpc_method**(***request_args*)

class luigi.scheduler.**scheduler**(**args*, ***kwargs*)
Bases: `luigi.task.Config`

retry_delay = FloatParameter (defaults to 900.0)

remove_delay = FloatParameter (defaults to 600.0)

worker_disconnect_delay = FloatParameter (defaults to 60.0)

state_path = Parameter (defaults to /var/lib/luigi-server/state.pickle)

batch_emails = BoolParameter (defaults to False): Send e-mails in batches rather than

disable_window = IntParameter (defaults to 3600)

retry_count = IntParameter (defaults to 999999999)

disable_hard_timeout = IntParameter (defaults to 999999999)

disable_persist = IntParameter (defaults to 86400)

max_shown_tasks = IntParameter (defaults to 100000)

max_graph_nodes = IntParameter (defaults to 100000)

record_task_history = BoolParameter (defaults to False)

prune_on_get_work = BoolParameter (defaults to False)

pause_enabled = BoolParameter (defaults to True)

send_messages = BoolParameter (defaults to True)

metrics_collector = EnumParameter (defaults to MetricsCollectors.default)

stable_done_cooldown_secs = IntParameter (defaults to 10): Sets cooldown period to av
Sets a cooldown period in seconds after a task was completed, during this period the same task will not accepted by the scheduler.

class luigi.scheduler.**Failures**(*window*)
Bases: `object`

This class tracks the number of failures in a given time window.

Failures added are marked with the current timestamp, and this class counts the number of failures in a sliding time window ending at the present.

Initialize with the given window.

Parameters **window** – how long to track failures for, as a float (number of seconds).

add_failure()
Add a failure event with the current timestamp.

num_failures()
Return the number of failures in the window.

clear()
Clear the failure queue.

class luigi.scheduler.**OrderedSet**(*iterable=None*)
Bases: `_abcoll.MutableSet`

Standard Python OrderedSet recipe found at http://code.activestate.com/recipes/576694/

Modified to include a peek function to get the last element

add(*key*)
Add an element.

discard(*key*)
Remove an element. Do not raise an exception if absent.

peek(*last=True*)

pop(*last=True*)
Return the popped value. Raise KeyError if empty.

class luigi.scheduler.**Task**(*task_id, status, deps, resources=None, priority=0, family=", module=None, params=None, param_visibilities=None, accepts_messages=False, tracking_url=None, status_message=None, progress_percentage=None, retry_policy='notoptional'*)
Bases: `object`

set_params(*params*)

is_batchable()

add_failure()

has_excessive_failures()

pretty_id

class luigi.scheduler.**Worker**(*worker_id, last_active=None*)
Bases: `object`

Structure for tracking worker activity and keeping their references.

add_info(*info*)

update(*worker_reference, get_work=False*)

prune(*config*)

get_tasks(*state, *statuses*)

is_trivial_worker(*state*)
If it's not an assistant having only tasks that are without requirements.

We have to pass the state parameter for optimization reasons.

assistant

enabled

state

add_rpc_message(*name, **kwargs*)

fetch_rpc_messages()

class luigi.scheduler.**SimpleTaskState**(*state_path*)

Bases: `object`

Keep track of the current state and handle persistence.

The point of this class is to enable other ways to keep state, eg. by using a database These will be implemented by creating an abstract base class that this and other classes inherit from.

get_state()

set_state(*state*)

dump()

load()

get_active_tasks()

get_active_tasks_by_status(**statuses*)

get_active_task_count_for_status(*status*)

get_batch_running_tasks(*batch_id*)

set_batcher(*worker_id*, *family*, *batcher_args*, *max_batch_size*)

get_batcher(*worker_id*, *family*)

num_pending_tasks()

Return how many tasks are PENDING + RUNNING. O(1).

get_task(*task_id*, *default=None*, *setdefault=None*)

has_task(*task_id*)

re_enable(*task*, *config=None*)

set_batch_running(*task*, *batch_id*, *worker_id*)

set_status(*task*, *new_status*, *config=None*)

fail_dead_worker_task(*task*, *config*, *assistants*)

update_status(*task*, *config*)

may_prune(*task*)

inactivate_tasks(*delete_tasks*)

get_active_workers(*last_active_lt=None*, *last_get_work_gt=None*)

get_assistants(*last_active_lt=None*)

get_worker_ids()

get_worker(*worker_id*)

inactivate_workers(*delete_workers*)

disable_workers(*worker_ids*)

update_metrics(*task*, *config*)

class luigi.scheduler.**Scheduler**(*config=None*, *resources=None*, *task_history_impl=None*, ***kwargs*)

Bases: `object`

Async scheduler that can handle multiple workers, etc.

Can be run locally or on a server (using RemoteScheduler + server.Server).

Keyword Arguments: :param config: an object of class "scheduler" or None (in which the global instance will be used) :param resources: a dict of str->int constraints :param task_history_impl: ignore config and use this object as the task history

load()

dump()

prune()

add_task_batcher(*worker*, *task_family*, *batched_args*, *max_batch_size=inf*)

forgive_failures(*task_id=None*)

mark_as_done(*task_id=None*)

add_task(*task_id=None*, *status='PENDING'*, *runnable=True*, *deps=None*, *new_deps=None*, *expl=None*, *resources=None*, *priority=0*, *family="*, *module=None*, *params=None*, *param_visibilities=None*, *accepts_messages=False*, *assistant=False*, *tracking_url=None*, *worker=None*, *batchable=None*, *batch_id=None*, *retry_policy_dict=None*, *owners=None*, ***kwargs*)

- add task identified by task_id if it doesn't exist
- if deps is not None, update dependency list
- update status of task
- add additional workers/stakeholders
- update priority when needed

announce_scheduling_failure(*task_name*, *family*, *params*, *expl*, *owners*, ***kwargs*)

add_worker(*worker*, *info*, ***kwargs*)

disable_worker(*worker*)

set_worker_processes(*worker*, *n*)

send_scheduler_message(*worker*, *task*, *content*)

add_scheduler_message_response(*task_id*, *message_id*, *response*)

get_scheduler_message_response(*task_id*, *message_id*)

has_task_history()

is_pause_enabled()

is_paused()

pause()

unpause()

update_resources(***resources*)

update_resource(*resource*, *amount*)

count_pending(*worker*)

get_work(*host=None*, *assistant=False*, *current_tasks=None*, *worker=None*, ***kwargs*)

ping(***kwargs*)

graph(***kwargs*)

dep_graph(*task_id*, *include_done=True*, ***kwargs*)

inverse_dep_graph(*task_id*, *include_done=True*, ***kwargs*)

task_list(*status=''*, *upstream_status=''*, *limit=True*, *search=None*, *max_shown_tasks=None*, ***kwargs*)
Query for a subset of tasks by status.

worker_list(*include_running=True*, ***kwargs*)

resource_list()
Resources usage info and their consumers (tasks).

resources()
get total resources and available ones

task_search(*task_str*, ***kwargs*)
Query for a subset of tasks by task_id.

Parameters **task_str** –

Returns

re_enable_task(*task_id*)

fetch_error(*task_id*, ***kwargs*)

set_task_status_message(*task_id*, *status_message*)

get_task_status_message(*task_id*)

set_task_progress_percentage(*task_id*, *progress_percentage*)

get_task_progress_percentage(*task_id*)

decrease_running_task_resources(*task_id*, *decrease_resources*)

get_running_task_resources(*task_id*)

task_history

update_metrics_task_started(*task*)

luigi.server module

Simple REST server that takes commands in a JSON payload Interface to the `Scheduler` class. See *Using the Central Scheduler* for more info.

class luigi.server.**cors**(**args*, ***kwargs*)
Bases: `luigi.task.Config`

enabled = BoolParameter (defaults to False): Enables CORS support.

allow_any_origin = BoolParameter (defaults to False): Accepts requests from any origi

allow_null_origin = BoolParameter (defaults to False): Allows the request to set `nul

max_age = IntParameter (defaults to 86400): Content of `Access-Control-Max-Age`.

allowed_methods = Parameter (defaults to GET, OPTIONS): Content of `Access-Control-All

allowed_headers = Parameter (defaults to Accept, Content-Type, Origin): Content of `A

exposed_headers = Parameter (defaults to): Content of `Access-Control-Expose-Headers

allow_credentials = BoolParameter (defaults to False): Indicates that the actual requ

allowed_origins = ListParameter (defaults to []): A list of allowed origins. Used onl

class luigi.server.**RPCHandler**(**args*, ***kwargs*)

Bases: tornado.web.RequestHandler

Handle remote scheduling calls using rpc.RemoteSchedulerResponder.

initialize(*scheduler*)

Hook for subclass initialization. Called for each request.

A dictionary passed as the third argument of a url spec will be supplied as keyword arguments to initialize().

Example:

```
class ProfileHandler(RequestHandler):
    def initialize(self, database):
        self.database = database

    def get(self, username):
        ...

app = Application([
    (r'/user/(.*)', ProfileHandler, dict(database=database)),
    ])
```

options(**args*)

get(*method*)

post(*method*)

class luigi.server.**BaseTaskHistoryHandler**(*application*, *request*, ***kwargs*)

Bases: tornado.web.RequestHandler

initialize(*scheduler*)

Hook for subclass initialization. Called for each request.

A dictionary passed as the third argument of a url spec will be supplied as keyword arguments to initialize().

Example:

```
class ProfileHandler(RequestHandler):
    def initialize(self, database):
        self.database = database

    def get(self, username):
        ...

app = Application([
    (r'/user/(.*)', ProfileHandler, dict(database=database)),
    ])
```

get_template_path()

Override to customize template path for each handler.

By default, we use the template_path application setting. Return None to load templates relative to the calling file.

class luigi.server.**AllRunHandler**(*application*, *request*, ***kwargs*)

Bases: *luigi.server.BaseTaskHistoryHandler*

get()

class luigi.server.**SelectedRunHandler**(*application*, *request*, ***kwargs*)
Bases: `luigi.server.BaseTaskHistoryHandler`

get(*name*)

luigi.server.**from_utc**(*utcTime*, *fmt=None*)
convert UTC time string to time.struct_time: change datetime.datetime to time, return time.struct_time type

class luigi.server.**RecentRunHandler**(*application*, *request*, ***kwargs*)
Bases: `luigi.server.BaseTaskHistoryHandler`

get()

class luigi.server.**ByNameHandler**(*application*, *request*, ***kwargs*)
Bases: `luigi.server.BaseTaskHistoryHandler`

get(*name*)

class luigi.server.**ByIdHandler**(*application*, *request*, ***kwargs*)
Bases: `luigi.server.BaseTaskHistoryHandler`

get(*id*)

class luigi.server.**ByParamsHandler**(*application*, *request*, ***kwargs*)
Bases: `luigi.server.BaseTaskHistoryHandler`

get(*name*)

class luigi.server.**RootPathHandler**(*application*, *request*, ***kwargs*)
Bases: `luigi.server.BaseTaskHistoryHandler`

get()

head()
HEAD endpoint for health checking the scheduler

class luigi.server.**MetricsHandler**(*application*, *request*, ***kwargs*)
Bases: `tornado.web.RequestHandler`

initialize(*scheduler*)
Hook for subclass initialization. Called for each request.

A dictionary passed as the third argument of a url spec will be supplied as keyword arguments to initialize().

Example:

```
class ProfileHandler(RequestHandler):
    def initialize(self, database):
        self.database = database

    def get(self, username):
        ...

app = Application([
    (r'/user/(.*)', ProfileHandler, dict(database=database)),
    ])
```

get()

luigi.server.**app**(*scheduler*)

luigi.server.**run**(*api_port=8082*, *address=None*, *unix_socket=None*, *scheduler=None*)
Runs one instance of the API server.

luigi.server.**stop**()

luigi.setup_logging module

This module contains helper classes for configuring logging for luigid and workers via command line arguments and options from config files.

class luigi.setup_logging.**BaseLogging**
Bases: `object`

config = <luigi.configuration.cfg_parser.LuigiConfigParser instance>

classmethod setup(*opts=<class 'luigi.setup_logging.opts'>*)
Setup logging via CLI params and config.

class luigi.setup_logging.**DaemonLogging**
Bases: *luigi.setup_logging.BaseLogging*

Configure logging for luigid

class luigi.setup_logging.**InterfaceLogging**
Bases: *luigi.setup_logging.BaseLogging*

Configure logging for worker

luigi.six module

luigi.target module

The abstract *Target* class. It is a central concept of Luigi and represents the state of the workflow.

class luigi.target.**Target**
Bases: `object`

A Target is a resource generated by a *Task*.

For example, a Target might correspond to a file in HDFS or data in a database. The Target interface defines one method that must be overridden: *exists()*, which signifies if the Target has been created or not.

Typically, a *Task* will define one or more Targets as output, and the Task is considered complete if and only if each of its output Targets exist.

exists()
Returns `True` if the *Target* exists and `False` otherwise.

exception luigi.target.**FileSystemException**
Bases: `exceptions.Exception`

Base class for generic file system exceptions.

exception luigi.target.**FileAlreadyExists**
Bases: *luigi.target.FileSystemException*

Raised when a file system operation can't be performed because a directory exists but is required to not exist.

exception luigi.target.**MissingParentDirectory**
Bases: *luigi.target.FileSystemException*

Raised when a parent directory doesn't exist. (Imagine mkdir without -p)

exception luigi.target.**NotADirectory**
Bases: *luigi.target.FileSystemException*

Raised when a file system operation can't be performed because an expected directory is actually a file.

class luigi.target.**FileSystem**

Bases: `object`

FileSystem abstraction used in conjunction with *`FileSystemTarget`*.

Typically, a FileSystem is associated with instances of a *`FileSystemTarget`*. The instances of the py:class:*FileSystemTarget* will delegate methods such as *`FileSystemTarget.exists()`* and *`FileSystemTarget.remove()`* to the FileSystem.

Methods of FileSystem raise *`FileSystemException`* if there is a problem completing the operation.

exists(*path*)

Return `True` if file or directory at `path` exist, `False` otherwise

Parameters **path** (*str*) – a path within the FileSystem to check for existence.

remove(*path*, *recursive=True*, *skip_trash=True*)

Remove file or directory at location `path`

Parameters

- **path** (*str*) – a path within the FileSystem to remove.
- **recursive** (*bool*) – if the path is a directory, recursively remove the directory and all of its descendants. Defaults to `True`.

mkdir(*path*, *parents=True*, *raise_if_exists=False*)

Create directory at location `path`

Creates the directory at `path` and implicitly create parent directories if they do not already exist.

Parameters

- **path** (*str*) – a path within the FileSystem to create as a directory.
- **parents** (*bool*) – Create parent directories when necessary. When parents=False and the parent directory doesn't exist, raise luigi.target.MissingParentDirectory
- **raise_if_exists** (*bool*) – raise luigi.target.FileAlreadyExists if the folder already exists.

isdir(*path*)

Return `True` if the location at `path` is a directory. If not, return `False`.

Parameters **path** (*str*) – a path within the FileSystem to check as a directory.

Note: This method is optional, not all FileSystem subclasses implements it.

listdir(*path*)

Return a list of files rooted in path.

This returns an iterable of the files rooted at `path`. This is intended to be a recursive listing.

Parameters **path** (*str*) – a path within the FileSystem to list.

Note: This method is optional, not all FileSystem subclasses implements it.

move(*path*, *dest*)

Move a file, as one would expect.

rename_dont_move(*path*, *dest*)

Potentially rename `path` to `dest`, but don't move it into the `dest` folder (if it is a folder). This relates to *Atomic Writes Problem*.

This method has a reasonable but not bullet proof default implementation. It will just do `move()` if the file doesn't `exists()` already.

rename (**args, **kwargs*)
Alias for `move()`

copy (*path, dest*)
Copy a file or a directory with contents. Currently, LocalFileSystem and MockFileSystem support only single file copying but S3Client copies either a file or a directory as required.

class `luigi.target.`**FileSystemTarget** (*path*)
Bases: `luigi.target.Target`

Base class for FileSystem Targets like `LocalTarget` and `HdfsTarget`.

A FileSystemTarget has an associated `FileSystem` to which certain operations can be delegated. By default, `exists()` and `remove()` are delegated to the `FileSystem`, which is determined by the `fs` property.

Methods of FileSystemTarget raise `FileSystemException` if there is a problem completing the operation.

Usage:

```
target = FileSystemTarget('~/some_file.txt')
target = FileSystemTarget(pathlib.Path('~') / 'some_file.txt')
target.exists()  # False
```

Initializes a FileSystemTarget instance.

Parameters **path** – the path associated with this FileSystemTarget.

fs
The `FileSystem` associated with this FileSystemTarget.

open (*mode*)
Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters **mode** (`str`) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

exists ()
Returns `True` if the path for this FileSystemTarget exists; `False` otherwise.

This method is implemented by using `fs`.

remove ()
Remove the resource at the path specified by this FileSystemTarget.

This method is implemented by using `fs`.

temporary_path (***kwds*)
A context manager that enables a reasonably short, general and magic-less way to solve the *Atomic Writes Problem*.

- On *entering*, it will create the parent directories so the temporary_path is writeable right away. This step uses `FileSystem.mkdir()`.
- On *exiting*, it will move the temporary file if there was no exception thrown. This step uses `FileSystem.rename_dont_move()`

The file system operations will be carried out by calling them on `fs`.

The typical use case looks like this:

```
class MyTask(luigi.Task):
    def output(self):
        return MyFileSystemTarget(...)

    def run(self):
        with self.output().temporary_path() as self.temp_output_path:
            run_some_external_command(output_path=self.temp_output_path)
```

class luigi.target.**AtomicLocalFile**(*path*)

Bases: `_io.BufferedWriter`

Abstract class to create a Target that creates a temporary file in the local filesystem before moving it to its final destination.

This class is just for the writing part of the Target. See *luigi.local_target.LocalTarget* for example

close()

Flush and close the IO object.

This method has no effect if the file is already closed.

generate_tmp_path(*path*)

move_to_final_destination()

tmp_path

luigi.task module

The abstract *Task* class. It is a central concept of Luigi and represents the state of the workflow. See *Tasks* for an overview.

luigi.task.**namespace**(*namespace=None*, *scope=''*)

Call to set namespace of tasks declared after the call.

It is often desired to call this function with the keyword argument `scope=__name__`.

The `scope` keyword makes it so that this call is only effective for task classes with a matching*[0] `__module__`. The default value for `scope` is the empty string, which means all classes. Multiple calls with the same scope simply replace each other.

The namespace of a *Task* can also be changed by specifying the property `task_namespace`.

```
class Task2(luigi.Task):
    task_namespace = 'namespace2'
```

This explicit setting takes priority over whatever is set in the `namespace()` method, and it's also inherited through normal python inheritence.

There's no equivalent way to set the `task_family`.

New since Luigi 2.6.0: `scope` keyword argument.

See also:

The new and better scaling *auto_namespace()*

[0] When there are multiple levels of matching module scopes like `a.b` vs `a.b.c`, the more specific one (`a.b.c`) wins.

luigi.task.**auto_namespace**(*scope=''*)

Same as *namespace()*, but instead of a constant namespace, it will be set to the `__module__` of the task class. This is desirable for these reasons:

- Two tasks with the same name will not have conflicting task families
- It's more pythonic, as modules are Python's recommended way to do namespacing.
- It's traceable. When you see the full name of a task, you can immediately identify where it is defined.

We recommend calling this function from your package's outermost `__init__.py` file. The file contents could look like this:

```
import luigi

luigi.auto_namespace(scope=__name__)
```

To reset an `auto_namespace()` call, you can use `namespace(scope='my_scope')`. But this will not be needed (and is also discouraged) if you use the `scope` kwarg.

New since Luigi 2.6.0.

luigi.task.**task_id_str**(*task_family*, *params*)

Returns a canonical string used to identify a particular task

Parameters

- **task_family** – The task family (class name) of the task
- **params** – a dict mapping parameter names to their serialized values

Returns A unique, shortened identifier corresponding to the family and params

exception luigi.task.**BulkCompleteNotImplementedError**

Bases: `exceptions.NotImplementedError`

This is here to trick pylint.

pylint thinks anything raising NotImplementedError needs to be implemented in any subclass. bulk_complete isn't like that. This tricks pylint into thinking that the default implementation is a valid implementation and not an abstract method.

class luigi.task.**Task**(**args*, ***kwargs*)

Bases: `object`

This is the base class of all Luigi Tasks, the base unit of work in Luigi.

A Luigi Task describes a unit or work.

The key methods of a Task, which must be implemented in a subclass are:

- *run()* - the computation done by this task.
- *requires()* - the list of Tasks that this Task depends on.
- *output()* - the output `Target` that this Task creates.

Each *Parameter* of the Task should be declared as members:

```
class MyTask(luigi.Task):
    count = luigi.IntParameter()
    second_param = luigi.Parameter()
```

In addition to any declared properties and methods, there are a few non-declared properties, which are created by the `Register` metaclass:

priority = 0
Priority of the task: the scheduler should favor available tasks with higher priority values first. See *Task priority*

disabled = False

resources = {}
Resources used by the task. Should be formatted like {"scp": 1} to indicate that the task requires 1 unit of the scp resource.

worker_timeout = None
Number of seconds after which to time out the run function. No timeout if set to 0. Defaults to 0 or worker-timeout value in config

max_batch_size = inf
Maximum number of tasks to run together as a batch. Infinite by default

batchable
True if this instance can be run as part of a batch. By default, True if it has any batched parameters

retry_count
Override this positive integer to have different `retry_count` at task level Check *[scheduler]*

disable_hard_timeout
Override this positive integer to have different `disable_hard_timeout` at task level. Check *[scheduler]*

disable_window_seconds
Override this positive integer to have different `disable_window_seconds` at task level. Check *[scheduler]*

owner_email
Override this to send out additional error emails to task owner, in addition to the one defined in the global configuration. This should return a string or a list of strings. e.g. 'test@exmaple.com' or ['test1@example.com', 'test2@example.com']

use_cmdline_section
Property used by core config such as *–workers* etc. These will be exposed without the class as prefix.

classmethod event_handler(*event*)
Decorator for adding event handlers.

trigger_event(*event*, **args*, ***kwargs*)
Trigger that calls all of the specified events associated with this class.

accepts_messages
For configuring which scheduler messages can be received. When falsy, this tasks does not accept any message. When True, all messages are accepted.

task_module
Returns what Python module to import to get access to this class.

task_namespace = '__not_user_specified'
This value can be overriden to set the namespace that will be used. (See *Namespaces, families and ids*) If it's not specified and you try to read this value anyway, it will return garbage. Please use `get_task_namespace()` to read the namespace.

Note that setting this value with `@property` will not work, because this is a class level value.

classmethod get_task_namespace()
The task family for the given class.

Note: You normally don't want to override this.

task_family = 'Task'

classmethod get_task_family()
The task family for the given class.

If `task_namespace` is not set, then it's simply the name of the class. Otherwise, `<task_namespace>.` is prefixed to the class name.

Note: You normally don't want to override this.

classmethod get_params()
Returns all of the Parameters for this Task.

classmethod batch_param_names()

classmethod get_param_names(*include_significant=False*)

classmethod get_param_values(*params*, *args*, *kwargs*)
Get the values of the parameters from the args and kwargs.

Parameters

- **params** – list of (param_name, Parameter).
- **args** – positional arguments
- **kwargs** – keyword arguments.

Returns list of *(name, value)* tuples, one for each parameter.

param_args

initialized()
Returns `True` if the Task is initialized and `False` otherwise.

classmethod from_str_params(*params_str*)
Creates an instance from a str->str hash.

Parameters params_str – dict of param name -> value as string.

to_str_params(*only_significant=False*, *only_public=False*)
Convert all parameters to a str->str hash.

clone(*cls=None*, ***kwargs*)
Creates a new instance from an existing instance where some of the args have changed.

There's at least two scenarios where this is useful (see test/clone_test.py):

- remove a lot of boiler plate when you have recursive dependencies and lots of args
- there's task inheritance and some logic is on the base class

Parameters

- **cls** –
- **kwargs** –

Returns

complete()
If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

classmethod bulk_complete(*parameter_tuples*)
Returns those of parameter_tuples for which this Task is complete.

Override (with an efficient implementation) for efficient scheduling with range tools. Keep the logic consistent with that of complete().

output()
The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

requires()
The Tasks that this Task depends on.

A Task will only run if all of the Tasks that it requires are completed. If your Task does not require any other Tasks, then you don't need to override this method. Otherwise, a subclass can override this method to return a single Task, a list of Task instances, or a dict whose values are Task instances.

See *Task.requires*

process_resources()
Override in "template" tasks which provide common resource functionality but allow subclasses to specify additional resources while preserving the name for consistent end-user experience.

input()
Returns the outputs of the Tasks returned by `requires()`

See *Task.input*

Returns a list of `Target` objects which are specified as outputs of all required Tasks.

deps()
Internal method used by the scheduler.

Returns the flattened list of requires.

run()
The task run method, to be overridden in a subclass.

See *Task.run*

on_failure(*exception*)
Override for custom error handling.

This method gets called if an exception is raised in `run()`. The returned value of this method is json encoded and sent to the scheduler as the *expl* argument. Its string representation will be used as the body of the error email sent out if any.

Default behavior is to return a string representation of the stack trace.

on_success()
Override for doing custom completion handling for a larger class of tasks

This method gets called when `run()` completes without raising any exceptions.

The returned value is json encoded and sent to the scheduler as the *expl* argument.

Default behavior is to send an None value

no_unpicklable_properties(***kwds*)

Remove unpicklable properties before dump task and resume them after.

This method could be called in subtask's dump method, to ensure unpicklable properties won't break dump.

This method is a context-manager which can be called as below:

class luigi.task.**MixinNaiveBulkComplete**

Bases: `object`

Enables a Task to be efficiently scheduled with e.g. range tools, by providing a bulk_complete implementation which checks completeness in a loop.

Applicable to tasks whose completeness checking is cheap.

This doesn't exploit output location specific APIs for speed advantage, nevertheless removes redundant scheduler roundtrips.

classmethod bulk_complete(*parameter_tuples*)

class luigi.task.**ExternalTask**(**args*, ***kwargs*)

Bases: *luigi.task.Task*

Subclass for references to external dependencies.

An ExternalTask's does not have a *run* implementation, which signifies to the framework that this Task's `output()` is generated outside of Luigi.

run = None

luigi.task.**externalize**(*taskclass_or_taskobject*)

Returns an externalized version of a Task. You may both pass an instantiated task object or a task class. Some examples:

```
class RequiringTask(luigi.Task):
    def requires(self):
        task_object = self.clone(MyTask)
        return externalize(task_object)

    ...
```

Here's mostly equivalent code, but `externalize` is applied to a task class instead.

```
@luigi.util.requires(externalize(MyTask))
class RequiringTask(luigi.Task):
    pass
    ...
```

Of course, it may also be used directly on classes and objects (for example for reexporting or other usage).

```
MyTask = externalize(MyTask)
my_task_2 = externalize(MyTask2(param='foo'))
```

If you however want a task class to be external from the beginning, you're better off inheriting *ExternalTask* rather than *Task*.

This function tries to be side-effect free by creating a copy of the class or the object passed in and then modify that object. In particular this code shouldn't do anything.

```
externalize(MyTask)  # BAD: This does nothing (as after luigi 2.4.0)
```

class luigi.task.**WrapperTask**(**args*, ***kwargs*)
Bases: *luigi.task.Task*

Use for tasks that only wrap other tasks and that by definition are done if all their requirements exist.

complete()
If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

class luigi.task.**Config**(**args*, ***kwargs*)
Bases: *luigi.task.Task*

Class for configuration. See *Configuration classes*.

luigi.task.**getpaths**(*struct*)
Maps all Tasks in a structured data object to their .output().

luigi.task.**flatten**(*struct*)
Creates a flat list of all all items in structured output (dicts, lists, items):

```
>>> sorted(flatten({'a': 'foo', 'b': 'bar'}))
['bar', 'foo']
>>> sorted(flatten(['foo', ['bar', 'troll']]))
['bar', 'foo', 'troll']
>>> flatten('foo')
['foo']
>>> flatten(42)
[42]
```

luigi.task.**flatten_output**(*task*)
Lists all output targets by recursively walking output-less (wrapper) tasks.

FIXME order consistently.

luigi.task_history module

Abstract class for task history. Currently the only subclass is *DbTaskHistory*.

class luigi.task_history.**StoredTask**(*task*, *status*, *host=None*)
Bases: `object`

Interface for methods on TaskHistory

task_family

parameters

class luigi.task_history.**TaskHistory**
Bases: `object`

Abstract Base Class for updating the run history of a task

task_scheduled(*task*)

task_finished(*task*, *successful*)

task_started(*task*, *worker_host*)

class luigi.task_history.**NopHistory**
Bases: *luigi.task_history.TaskHistory*

task_scheduled(*task*)

task_finished(*task*, *successful*)

task_started(*task*, *worker_host*)

luigi.task_register module

Define the centralized register of all *Task* classes.

exception luigi.task_register.**TaskClassException**
Bases: exceptions.Exception

exception luigi.task_register.**TaskClassNotFoundException**
Bases: *luigi.task_register.TaskClassException*

exception luigi.task_register.**TaskClassAmbigiousException**
Bases: *luigi.task_register.TaskClassException*

class luigi.task_register.**Register**
Bases: abc.ABCMeta

The Metaclass of Task.

Acts as a global registry of Tasks with the following properties:

1. Cache instances of objects so that eg. X(1, 2, 3) always returns the same object.
2. Keep track of all subclasses of Task and expose them.

Custom class creation for namespacing.

Also register all subclasses.

When the set or inherited namespace evaluates to None, set the task namespace to whatever the currently declared namespace is.

AMBIGUOUS_CLASS = <object object>
If this value is returned by _get_reg() then there is an ambiguous task name (two Task have the same name). This denotes an error.

classmethod clear_instance_cache()
Clear/Reset the instance cache.

classmethod disable_instance_cache()
Disables the instance cache.

task_family
Internal note: This function will be deleted soon.

classmethod task_names()
List of task names as strings

classmethod tasks_str()
Human-readable register contents dump.

classmethod get_task_cls(*name*)
Returns an unambiguous class or raises an exception.

classmethod get_all_params()
Compiles and returns all parameters for all Task.

Returns a generator of tuples (TODO: we should make this more elegant)

luigi.task_register.**load_task**(*module*, *task_name*, *params_str*)
Imports task dynamically given a module and a task name.

luigi.task_status module

Possible values for a Task's status in the Scheduler

luigi.util module

Using `inherits` and `requires` to ease parameter pain

Most luigi plumbers will find themselves in an awkward task parameter situation at some point or another. Consider the following "parameter explosion" problem:

```
class TaskA(luigi.ExternalTask):
    param_a = luigi.Parameter()

    def output(self):
        return luigi.LocalTarget('/tmp/log-{t.param_a}'.format(t=self))

class TaskB(luigi.Task):
    param_b = luigi.Parameter()
    param_a = luigi.Parameter()

    def requires(self):
        return TaskA(param_a=self.param_a)

class TaskC(luigi.Task):
    param_c = luigi.Parameter()
    param_b = luigi.Parameter()
    param_a = luigi.Parameter()

    def requires(self):
        return TaskB(param_b=self.param_b, param_a=self.param_a)
```

In work flows requiring many tasks to be chained together in this manner, parameter handling can spiral out of control. Each downstream task becomes more burdensome than the last. Refactoring becomes more difficult. There are several ways one might try and avoid the problem.

Approach 1: Parameters via command line or config instead of *`requires()`*.

```
class TaskA(luigi.ExternalTask):
    param_a = luigi.Parameter()

    def output(self):
        return luigi.LocalTarget('/tmp/log-{t.param_a}'.format(t=self))

class TaskB(luigi.Task):
    param_b = luigi.Parameter()

    def requires(self):
        return TaskA()

class TaskC(luigi.Task):
    param_c = luigi.Parameter()

    def requires(self):
        return TaskB()
```

Then run in the shell like so:

```
luigi --module my_tasks TaskC --param-c foo --TaskB-param-b bar --TaskA-param-a baz
```

Repetitive parameters have been eliminated, but at the cost of making the job's command line interface slightly clunkier. Often this is a reasonable trade-off.

But parameters can't always be refactored out every class. Downstream tasks might also need to use some of those parameters. For example, if `TaskC` needs to use `param_a` too, then `param_a` would still need to be repeated.

Approach 2: Use a common parameter class

```
class Params(luigi.Config):
    param_c = luigi.Parameter()
    param_b = luigi.Parameter()
    param_a = luigi.Parameter()

class TaskA(Params, luigi.ExternalTask):
    def output(self):
        return luigi.LocalTarget('/tmp/log-{t.param_a}'.format(t=self))

class TaskB(Params):
    def requires(self):
        return TaskA()

class TaskB(Params):
    def requires(self):
        return TaskB()
```

This looks great at first glance, but a couple of issues lurk. Now `TaskA` and `TaskB` have unnecessary significant parameters. Significant parameters help define the identity of a task. Identical tasks are prevented from running at the same time by the central planner. This helps preserve the idempotent and atomic nature of luigi tasks. Unnecessary significant task parameters confuse a task's identity. Under the right circumstances, task identity confusion could lead to that task running when it shouldn't, or failing to run when it should.

This approach should only be used when all of the parameters of the config class, are significant (or all insignificant) for all of its subclasses.

And wait a second… there's a bug in the above code. See it?

`TaskA` won't behave as an `ExternalTask` because the parent classes are specified in the wrong order. This contrived example is easy to fix (by swapping the ordering of the parents of `TaskA`), but real world cases can be more difficult to both spot and fix. Inheriting from multiple classes derived from *`Task`* should be undertaken with caution and avoided where possible.

Approach 3: Use *`inherits`* and *`requires`*

The *`inherits`* class decorator in this module copies parameters (and nothing else) from one task class to another, and avoids direct pythonic inheritance.

```
import luigi
from luigi.util import inherits

class TaskA(luigi.ExternalTask):
    param_a = luigi.Parameter()

    def output(self):
        return luigi.LocalTarget('/tmp/log-{t.param_a}'.format(t=self))

@inherits(TaskA)
class TaskB(luigi.Task):
```

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```
    param_b = luigi.Parameter()

    def requires(self):
        t = self.clone(TaskA)  # or t = self.clone_parent()

        # Wait... whats this clone thingy do?
        #
        # Pass it a task class.  It calls that task.  And when it does, it
        # supplies all parameters (and only those parameters) common to
        # the caller and callee!
        #
        # The call to clone is equivalent to the following (note the
        # fact that clone avoids passing param_b).
        #
        #   return TaskA(param_a=self.param_a)

        return t

@inherits(TaskB)
class TaskC(luigi.Task):
    param_c = luigi.Parameter()

    def requires(self):
        return self.clone(TaskB)
```

This totally eliminates the need to repeat parameters, avoids inheritance issues, and keeps the task command line interface as simple (as it can be, anyway). Refactoring task parameters is also much easier.

The `requires` helper function can reduce this pattern even further. It does everything `inherits` does, and also attaches a `requires` method to your task (still all without pythonic inheritance).

But how does it know how to invoke the upstream task? It uses `clone()` behind the scenes!

```
import luigi
from luigi.util import inherits, requires

class TaskA(luigi.ExternalTask):
    param_a = luigi.Parameter()

    def output(self):
        return luigi.LocalTarget('/tmp/log-{t.param_a}'.format(t=self))

@requires(TaskA)
class TaskB(luigi.Task):
    param_b = luigi.Parameter()

    # The class decorator does this for me!
    # def requires(self):
    #     return self.clone(TaskA)
```

Use these helper functions effectively to avoid unnecessary repetition and dodge a few potentially nasty workflow pitfalls at the same time. Brilliant!

`luigi.util.`**`common_params`**`(`*task_instance*, *task_cls*`)`
Grab all the values in task_instance that are found in task_cls.

`class` `luigi.util.`**`inherits`**`(`**tasks_to_inherit*`)`
Bases: `object`

Task inheritance.

New after Luigi 2.7.6: multiple arguments support.

Usage:

```
class AnotherTask(luigi.Task):
    m = luigi.IntParameter()

class YetAnotherTask(luigi.Task):
    n = luigi.IntParameter()

@inherits(AnotherTask)
class MyFirstTask(luigi.Task):
    def requires(self):
       return self.clone_parent()

    def run(self):
       print self.m # this will be defined
       # ...

@inherits(AnotherTask, YetAnotherTask)
class MySecondTask(luigi.Task):
    def requires(self):
       return self.clone_parents()

    def run(self):
       print self.n # this will be defined
       # ...
```

class luigi.util.**requires**(**tasks_to_require*)

Bases: `object`

Same as *inherits*, but also auto-defines the requires method.

New after Luigi 2.7.6: multiple arguments support.

class luigi.util.**copies**(*task_to_copy*)

Bases: `object`

Auto-copies a task.

Usage:

```
@copies(MyTask):
class CopyOfMyTask(luigi.Task):
    def output(self):
       return LocalTarget(self.date.strftime('/var/xyz/report-%Y-%m-%d'))
```

luigi.util.**delegates**(*task_that_delegates*)

Lets a task call methods on subtask(s).

The way this works is that the subtask is run as a part of the task, but the task itself doesn't have to care about the requirements of the subtasks. The subtask doesn't exist from the scheduler's point of view, and its dependencies are instead required by the main task.

Example:

```
class PowersOfN(luigi.Task):
    n = luigi.IntParameter()
    def f(self, x): return x ** self.n
```

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```
@delegates
class T(luigi.Task):
    def subtasks(self): return PowersOfN(5)
    def run(self): print self.subtasks().f(42)
```

luigi.util.**previous**(*task*)
Return a previous Task of the same family.

By default checks if this task family only has one non-global parameter and if it is a DateParameter, DateHourParameter or DateIntervalParameter in which case it returns with the time decremented by 1 (hour, day or interval)

luigi.util.**get_previous_completed**(*task*, *max_steps=10*)

luigi.worker module

The worker communicates with the scheduler and does two things:

1. Sends all tasks that has to be run
2. Gets tasks from the scheduler that should be run

When running in local mode, the worker talks directly to a *Scheduler* instance. When you run a central server, the worker will talk to the scheduler using a *RemoteScheduler* instance.

Everything in this module is private to luigi and may change in incompatible ways between versions. The exception is the exception types and the *worker* config class.

exception luigi.worker.**TaskException**
Bases: exceptions.Exception

class luigi.worker.**GetWorkResponse**(*task_id*, *running_tasks*, *n_pending_tasks*, *n_unique_pending*, *n_pending_last_scheduled*, *worker_state*)
Bases: tuple

Create new instance of GetWorkResponse(task_id, running_tasks, n_pending_tasks, n_unique_pending, n_pending_last_scheduled, worker_state)

n_pending_last_scheduled
Alias for field number 4

n_pending_tasks
Alias for field number 2

n_unique_pending
Alias for field number 3

running_tasks
Alias for field number 1

task_id
Alias for field number 0

worker_state
Alias for field number 5

class luigi.worker.**TaskProcess**(*task*, *worker_id*, *result_queue*, *status_reporter*, *use_multiprocessing=False*, *worker_timeout=0*, *check_unfulfilled_deps=True*, *check_complete_on_run=False*)

Bases: `multiprocessing.process.Process`

Wrap all task execution in this class.

Mainly for convenience since this is run in a separate process.

forward_reporter_attributes = {'decrease_running_resources': 'decrease_running_resour

run()

Method to be run in sub-process; can be overridden in sub-class

terminate()

Terminate this process and its subprocesses.

class luigi.worker.**ContextManagedTaskProcess**(*context*, **args*, ***kwargs*)

Bases: *luigi.worker.TaskProcess*

run()

Method to be run in sub-process; can be overridden in sub-class

class luigi.worker.**TaskStatusReporter**(*scheduler*, *task_id*, *worker_id*, *scheduler_messages*)

Bases: `object`

Reports task status information to the scheduler.

This object must be pickle-able for passing to *TaskProcess* on systems where fork method needs to pickle the process object (e.g. Windows).

update_tracking_url(*tracking_url*)

update_status_message(*message*)

update_progress_percentage(*percentage*)

decrease_running_resources(*decrease_resources*)

class luigi.worker.**SchedulerMessage**(*scheduler*, *task_id*, *message_id*, *content*, ***payload*)

Bases: `object`

Message object that is build by the the *Worker* when a message from the scheduler is received and passed to the message queue of a `Task`.

respond(*response*)

class luigi.worker.**SingleProcessPool**

Bases: `object`

Dummy process pool for using a single processor.

Imitates the api of multiprocessing.Pool using single-processor equivalents.

apply_async(*function*, *args*)

close()

join()

class luigi.worker.**DequeQueue**

Bases: `collections.deque`

deque wrapper implementing the Queue interface.

put(*obj*, *block=None*, *timeout=None*)

get(*block=None*, *timeout=None*)

exception luigi.worker.**AsyncCompletionException**(*trace*)

Bases: exceptions.Exception

Exception indicating that something went wrong with checking complete.

class luigi.worker.**TracebackWrapper**(*trace*)

Bases: object

Class to wrap tracebacks so we can know they're not just strings.

luigi.worker.**check_complete**(*task*, *out_queue*)

Checks if task is complete, puts the result to out_queue.

class luigi.worker.**worker**(**args*, ***kwargs*)

Bases: *luigi.task.Config*

id = Parameter (defaults to): Override the auto-generated worker_id

ping_interval = FloatParameter (defaults to 1.0)

keep_alive = BoolParameter (defaults to False)

count_uniques = BoolParameter (defaults to False): worker-count-uniques means that we

count_last_scheduled = BoolParameter (defaults to False): Keep a worker alive only if

wait_interval = FloatParameter (defaults to 1.0)

wait_jitter = FloatParameter (defaults to 5.0)

max_keep_alive_idle_duration = TimeDeltaParameter (defaults to 0:00:00)

max_reschedules = IntParameter (defaults to 1)

timeout = IntParameter (defaults to 0)

task_limit = IntParameter (defaults to None)

retry_external_tasks = BoolParameter (defaults to False): If true, incomplete externa

send_failure_email = BoolParameter (defaults to True): If true, send e-mails directly

no_install_shutdown_handler = BoolParameter (defaults to False): If true, the SIGUSR1

check_unfulfilled_deps = BoolParameter (defaults to True): If true, check for complet

check_complete_on_run = BoolParameter (defaults to False): If true, only mark tasks a

force_multiprocessing = BoolParameter (defaults to False): If true, use multiprocessi

task_process_context = OptionalParameter (defaults to None): If set to a fully qualif

class luigi.worker.**KeepAliveThread**(*scheduler*, *worker_id*, *ping_interval*, *rpc_message_callback*)

Bases: threading.Thread

Periodically tell the scheduler that the worker still lives.

stop()

run()

Method representing the thread's activity.

You may override this method in a subclass. The standard run() method invokes the callable object passed to the object's constructor as the target argument, if any, with sequential and keyword arguments taken from the args and kwargs arguments, respectively.

luigi.worker.**rpc_message_callback**(*fn*)

class luigi.worker.**Worker**(*scheduler=None*, *worker_id=None*, *worker_processes=1*, *assistant=False*, ***kwargs*)

Bases: object

Worker object communicates with a scheduler.

Simple class that talks to a scheduler and:

- tells the scheduler what it has to do + its dependencies
- asks for stuff to do (pulls it in a loop and runs it)

add(*task*, *multiprocess=False*, *processes=0*)

Add a Task for the worker to check and possibly schedule and run.

Returns True if task and its dependencies were successfully scheduled or completed before.

handle_interrupt(*signum*, *_*)

Stops the assistant from asking for more work on SIGUSR1

run()

Returns True if all scheduled tasks were executed successfully.

set_worker_processes(*n*)

dispatch_scheduler_message(*task_id*, *message_id*, *content*, ***kwargs*)

9.1.3 Module contents

Package containing core luigi functionality.

class luigi.**Task**(**args*, ***kwargs*)

Bases: object

This is the base class of all Luigi Tasks, the base unit of work in Luigi.

A Luigi Task describes a unit or work.

The key methods of a Task, which must be implemented in a subclass are:

- *run()* - the computation done by this task.
- *requires()* - the list of Tasks that this Task depends on.
- *output()* - the output *Target* that this Task creates.

Each *Parameter* of the Task should be declared as members:

```
class MyTask(luigi.Task):
    count = luigi.IntParameter()
    second_param = luigi.Parameter()
```

In addition to any declared properties and methods, there are a few non-declared properties, which are created by the Register metaclass:

priority = 0

Priority of the task: the scheduler should favor available tasks with higher priority values first. See *Task priority*

disabled = False

resources = {}

Resources used by the task. Should be formatted like {“scp”: 1} to indicate that the task requires 1 unit of the scp resource.

worker_timeout = None
Number of seconds after which to time out the run function. No timeout if set to 0. Defaults to 0 or worker-timeout value in config

max_batch_size = inf
Maximum number of tasks to run together as a batch. Infinite by default

batchable
True if this instance can be run as part of a batch. By default, True if it has any batched parameters

retry_count
Override this positive integer to have different `retry_count` at task level Check *[scheduler]*

disable_hard_timeout
Override this positive integer to have different `disable_hard_timeout` at task level. Check *[scheduler]*

disable_window_seconds
Override this positive integer to have different `disable_window_seconds` at task level. Check *[scheduler]*

owner_email
Override this to send out additional error emails to task owner, in addition to the one defined in the global configuration. This should return a string or a list of strings. e.g. 'test@exmaple.com' or ['test1@example.com', 'test2@example.com']

use_cmdline_section
Property used by core config such as *–workers* etc. These will be exposed without the class as prefix.

classmethod event_handler(*event*)
Decorator for adding event handlers.

trigger_event(*event*, **args*, ***kwargs*)
Trigger that calls all of the specified events associated with this class.

accepts_messages
For configuring which scheduler messages can be received. When falsy, this tasks does not accept any message. When True, all messages are accepted.

task_module
Returns what Python module to import to get access to this class.

task_namespace = '__not_user_specified'
This value can be overriden to set the namespace that will be used. (See *Namespaces, families and ids*) If it's not specified and you try to read this value anyway, it will return garbage. Please use *`get_task_namespace()`* to read the namespace.

Note that setting this value with `@property` will not work, because this is a class level value.

classmethod get_task_namespace()
The task family for the given class.

Note: You normally don't want to override this.

task_family = 'Task'

classmethod get_task_family()
The task family for the given class.

If `task_namespace` is not set, then it's simply the name of the class. Otherwise, `<task_namespace>.` is prefixed to the class name.

Note: You normally don't want to override this.

classmethod get_params()
Returns all of the Parameters for this Task.

classmethod batch_param_names()

classmethod get_param_names(*include_significant=False*)

classmethod get_param_values(*params*, *args*, *kwargs*)
Get the values of the parameters from the args and kwargs.

Parameters

- **params** – list of (param_name, Parameter).
- **args** – positional arguments
- **kwargs** – keyword arguments.

Returns list of *(name, value)* tuples, one for each parameter.

param_args

initialized()
Returns `True` if the Task is initialized and `False` otherwise.

classmethod from_str_params(*params_str*)
Creates an instance from a str->str hash.

Parameters **params_str** – dict of param name -> value as string.

to_str_params(*only_significant=False*, *only_public=False*)
Convert all parameters to a str->str hash.

clone(*cls=None*, ***kwargs*)
Creates a new instance from an existing instance where some of the args have changed.

There's at least two scenarios where this is useful (see test/clone_test.py):

- remove a lot of boiler plate when you have recursive dependencies and lots of args
- there's task inheritance and some logic is on the base class

Parameters

- **cls** –
- **kwargs** –

Returns

complete()
If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

classmethod bulk_complete(*parameter_tuples*)
Returns those of parameter_tuples for which this Task is complete.

Override (with an efficient implementation) for efficient scheduling with range tools. Keep the logic consistent with that of complete().

output()
The output that this Task produces.

The output of the Task determines if the Task needs to be run–the task is considered finished iff the outputs all exist. Subclasses should override this method to return a single `Target` or a list of `Target` instances.

Implementation note If running multiple workers, the output must be a resource that is accessible by all workers, such as a DFS or database. Otherwise, workers might compute the same output since they don't see the work done by other workers.

See *Task.output*

`requires``()`

The Tasks that this Task depends on.

A Task will only run if all of the Tasks that it requires are completed. If your Task does not require any other Tasks, then you don't need to override this method. Otherwise, a subclass can override this method to return a single Task, a list of Task instances, or a dict whose values are Task instances.

See *Task.requires*

`process_resources``()`

Override in "template" tasks which provide common resource functionality but allow subclasses to specify additional resources while preserving the name for consistent end-user experience.

`input``()`

Returns the outputs of the Tasks returned by `requires()`

See *Task.input*

Returns a list of `Target` objects which are specified as outputs of all required Tasks.

`deps``()`

Internal method used by the scheduler.

Returns the flattened list of requires.

`run``()`

The task run method, to be overridden in a subclass.

See *Task.run*

`on_failure``(`*exception*`)`

Override for custom error handling.

This method gets called if an exception is raised in `run()`. The returned value of this method is json encoded and sent to the scheduler as the *expl* argument. Its string representation will be used as the body of the error email sent out if any.

Default behavior is to return a string representation of the stack trace.

`on_success``()`

Override for doing custom completion handling for a larger class of tasks

This method gets called when `run()` completes without raising any exceptions.

The returned value is json encoded and sent to the scheduler as the *expl* argument.

Default behavior is to send an None value

`no_unpicklable_properties``(`***kwds*`)`

Remove unpicklable properties before dump task and resume them after.

This method could be called in subtask's dump method, to ensure unpicklable properties won't break dump.

This method is a context-manager which can be called as below:

`class` `luigi.`**`Config`**`(`**args*, ***kwargs*`)`

Bases: `luigi.task.Task`

Class for configuration. See *Configuration classes*.

class luigi.**ExternalTask**(**args*, ***kwargs*)

Bases: `luigi.task.Task`

Subclass for references to external dependencies.

An ExternalTask's does not have a *run* implementation, which signifies to the framework that this Task's `output()` is generated outside of Luigi.

run = None

class luigi.**WrapperTask**(**args*, ***kwargs*)

Bases: `luigi.task.Task`

Use for tasks that only wrap other tasks and that by definition are done if all their requirements exist.

complete()

If the task has any outputs, return `True` if all outputs exist. Otherwise, return `False`.

However, you may freely override this method with custom logic.

luigi.**namespace**(*namespace=None*, *scope="*)

Call to set namespace of tasks declared after the call.

It is often desired to call this function with the keyword argument `scope=__name__`.

The `scope` keyword makes it so that this call is only effective for task classes with a matching*[0] `__module__`. The default value for `scope` is the empty string, which means all classes. Multiple calls with the same scope simply replace each other.

The namespace of a `Task` can also be changed by specifying the property `task_namespace`.

```python
class Task2(luigi.Task):
    task_namespace = 'namespace2'
```

This explicit setting takes priority over whatever is set in the `namespace()` method, and it's also inherited through normal python inheritence.

There's no equivalent way to set the `task_family`.

New since Luigi 2.6.0: `scope` keyword argument.

See also:

The new and better scaling `auto_namespace()`

luigi.**auto_namespace**(*scope="*)

Same as `namespace()`, but instead of a constant namespace, it will be set to the `__module__` of the task class. This is desirable for these reasons:

- Two tasks with the same name will not have conflicting task families
- It's more pythonic, as modules are Python's recommended way to do namespacing.
- It's traceable. When you see the full name of a task, you can immediately identify where it is defined.

We recommend calling this function from your package's outermost `__init__.py` file. The file contents could look like this:

```python
import luigi

luigi.auto_namespace(scope=__name__)
```

[0] When there are multiple levels of matching module scopes like `a.b` vs `a.b.c`, the more specific one (`a.b.c`) wins.

To reset an `auto_namespace()` call, you can use `namespace(scope='my_scope')`. But this will not be needed (and is also discouraged) if you use the `scope` kwarg.

New since Luigi 2.6.0.

class `luigi.`**`Target`**

Bases: `object`

A Target is a resource generated by a *`Task`*.

For example, a Target might correspond to a file in HDFS or data in a database. The Target interface defines one method that must be overridden: *`exists()`*, which signifies if the Target has been created or not.

Typically, a *`Task`* will define one or more Targets as output, and the Task is considered complete if and only if each of its output Targets exist.

`exists``()`

Returns `True` if the *`Target`* exists and `False` otherwise.

class `luigi.`**`LocalTarget`**`(`*path=None*, *format=None*, *is_tmp=False*`)`

Bases: *`luigi.target.FileSystemTarget`*

`fs = <luigi.local_target.LocalFileSystem object>`

`makedirs``()`

Create all parent folders if they do not exist.

`open``(`*mode='r'*`)`

Open the FileSystem target.

This method returns a file-like object which can either be read from or written to depending on the specified mode.

Parameters **`mode`** (`str`) – the mode *r* opens the FileSystemTarget in read-only mode, whereas *w* will open the FileSystemTarget in write mode. Subclasses can implement additional options. Using *b* is not supported; initialize with *format=Nop* instead.

`move``(`*new_path*, *raise_if_exists=False*`)`

`move_dir``(`*new_path*`)`

`remove``()`

Remove the resource at the path specified by this FileSystemTarget.

This method is implemented by using *`fs`*.

`copy``(`*new_path*, *raise_if_exists=False*`)`

`fn`

class `luigi.`**`RemoteScheduler`**`(`*url='http://localhost:8082/'*, *connect_timeout=None*`)`

Bases: `object`

Scheduler proxy object. Talks to a RemoteSchedulerResponder.

`add_scheduler_message_response``(`**args*, ***kwargs*`)`

`add_task``(`**args*, ***kwargs*`)`

- add task identified by task_id if it doesn't exist
- if deps is not None, update dependency list
- update status of task
- add additional workers/stakeholders

- update priority when needed

`add_task_batcher`(**args*, ***kwargs*)

`add_worker`(**args*, ***kwargs*)

`announce_scheduling_failure`(**args*, ***kwargs*)

`count_pending`(**args*, ***kwargs*)

`decrease_running_task_resources`(**args*, ***kwargs*)

`dep_graph`(**args*, ***kwargs*)

`disable_worker`(**args*, ***kwargs*)

`fetch_error`(**args*, ***kwargs*)

`forgive_failures`(**args*, ***kwargs*)

`get_running_task_resources`(**args*, ***kwargs*)

`get_scheduler_message_response`(**args*, ***kwargs*)

`get_task_progress_percentage`(**args*, ***kwargs*)

`get_task_status_message`(**args*, ***kwargs*)

`get_work`(**args*, ***kwargs*)

`graph`(**args*, ***kwargs*)

`has_task_history`(**args*, ***kwargs*)

`inverse_dep_graph`(**args*, ***kwargs*)

`is_pause_enabled`(**args*, ***kwargs*)

`is_paused`(**args*, ***kwargs*)

`mark_as_done`(**args*, ***kwargs*)

`pause`(**args*, ***kwargs*)

`ping`(**args*, ***kwargs*)

`prune`(**args*, ***kwargs*)

`re_enable_task`(**args*, ***kwargs*)

`resource_list`(**args*, ***kwargs*)
Resources usage info and their consumers (tasks).

`send_scheduler_message`(**args*, ***kwargs*)

`set_task_progress_percentage`(**args*, ***kwargs*)

`set_task_status_message`(**args*, ***kwargs*)

`set_worker_processes`(**args*, ***kwargs*)

`task_list`(**args*, ***kwargs*)
Query for a subset of tasks by status.

`task_search`(**args*, ***kwargs*)
Query for a subset of tasks by task_id.

Parameters **`task_str`** –

Returns

unpause (**args*, ***kwargs*)

update_metrics_task_started (**args*, ***kwargs*)

update_resource (**args*, ***kwargs*)

update_resources (**args*, ***kwargs*)

worker_list (**args*, ***kwargs*)

exception luigi.**RPCError** (*message*, *sub_exception=None*)

Bases: `exceptions.Exception`

class luigi.**Parameter** (*default=<object object>*, *is_global=False*, *significant=True*, *description=None*, *config_path=None*, *positional=True*, *always_in_help=False*, *batch_method=None*, *visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: `object`

Parameter whose value is a `str`, and a base class for other parameter types.

Parameters are objects set on the Task class level to make it possible to parameterize tasks. For instance:

```
class MyTask(luigi.Task):
    foo = luigi.Parameter()

class RequiringTask(luigi.Task):
    def requires(self):
        return MyTask(foo="hello")

    def run(self):
        print(self.requires().foo)  # prints "hello"
```

This makes it possible to instantiate multiple tasks, eg `MyTask(foo='bar')` and `MyTask(foo='baz')`. The task will then have the `foo` attribute set appropriately.

When a task is instantiated, it will first use any argument as the value of the parameter, eg. if you instantiate `a = TaskA(x=44)` then `a.x == 44`. When the value is not provided, the value will be resolved in this order of falling priority:

- Any value provided on the command line:
  - To the root task (eg. `--param xyz`)
  - Then to the class, using the qualified task name syntax (eg. `--TaskA-param xyz`).
- With `[TASK_NAME]>PARAM_NAME: <serialized value>` syntax. See *Parameters from config Ingestion*
- Any default value set using the `default` flag.

Parameter objects may be reused, but you must then set the `positional=False` flag.

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.

- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

has_task_value(*task_name*, *param_name*)

task_value(*task_name*, *param_name*)

parse(*x*)

Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

serialize(*x*)

Opposite of *parse()*.

Converts the value `x` to a string.

Parameters **x** – the value to serialize.

normalize(*x*)

Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

next_in_enumeration(*_value*)

If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *luigi.execution_summary* module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **value** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

class luigi.**DateParameter**(*interval=1*, *start=None*, ***kwargs*)
Bases: `luigi.parameter._DateParameterBase`

Parameter whose value is a `date`.

A DateParameter is a Date string formatted `YYYY-MM-DD`. For example, `2013-07-10` specifies July 10, 2013.

DateParameters are 90% of the time used to be interpolated into file system paths or the like. Here is a gentle reminder of how to interpolate date parameters into strings:

```python
class MyTask(luigi.Task):
    date = luigi.DateParameter()

    def run(self):
        templated_path = "/my/path/to/my/dataset/{date:%Y/%m/%d}/"
        instantiated_path = templated_path.format(date=self.date)
        # print(instantiated_path) --> /my/path/to/my/dataset/2016/06/09/
        # ... use instantiated_path ...
```

To set this parameter to default to the current day. You can write code like this:

```python
import datetime

class MyTask(luigi.Task):
    date = luigi.DateParameter(default=datetime.date.today())
```

date_format = '%Y-%m-%d'

next_in_enumeration(*value*)
If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *luigi.execution_summary* module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **value** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

normalize(*value*)
Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

class luigi.**MonthParameter**(*interval=1*, *start=None*, ***kwargs*)
Bases: *luigi.parameter.DateParameter*

Parameter whose value is a `date`, specified to the month (day of `date` is "rounded" to first of the month).

A MonthParameter is a Date string formatted `YYYY-MM`. For example, `2013-07` specifies July of 2013. Task objects constructed from code accept `date` (ignoring the day value) or *Month*.

date_format = '%Y-%m'

next_in_enumeration(*value*)
If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *luigi.execution_summary* module for pretty printing purposes.

Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **`value`** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

`normalize`(*value*)
Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

class `luigi.`**`YearParameter`**(*interval=1*, *start=None*, ***kwargs*)
Bases: *`luigi.parameter.DateParameter`*

Parameter whose value is a `date`, specified to the year (day and month of `date` is "rounded" to first day of the year).

A YearParameter is a Date string formatted `YYYY`. Task objects constructed from code accept `date` (ignoring the month and day values) or *`Year`*.

`date_format = '%Y'`

`next_in_enumeration`(*value*)
If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *`luigi.execution_summary`* module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **`value`** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

`normalize`(*value*)
Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

class `luigi.`**`DateHourParameter`**(*interval=1*, *start=None*, ***kwargs*)
Bases: `luigi.parameter._DatetimeParameterBase`

Parameter whose value is a `datetime` specified to the hour.

A DateHourParameter is a ISO 8601 formatted date and time specified to the hour. For example, `2013-07-10T19` specifies July 10, 2013 at 19:00.

`date_format = '%Y-%m-%dT%H'`

class `luigi.`**`DateMinuteParameter`**(*interval=1*, *start=None*, ***kwargs*)
Bases: `luigi.parameter._DatetimeParameterBase`

Parameter whose value is a `datetime` specified to the minute.

A DateMinuteParameter is a ISO 8601 formatted date and time specified to the minute. For example, `2013-07-10T1907` specifies July 10, 2013 at 19:07.

The interval parameter can be used to clamp this parameter to every N minutes, instead of every minute.

date_format = '%Y-%m-%dT%H%M'

deprecated_date_format = '%Y-%m-%dT%HH%M'

parse(*s*)
Parses a string to a `datetime`.

class luigi.**DateSecondParameter**(*interval=1*, *start=None*, ***kwargs*)
Bases: `luigi.parameter._DatetimeParameterBase`

Parameter whose value is a `datetime` specified to the second.

A DateSecondParameter is a ISO 8601 formatted date and time specified to the second. For example, `2013-07-10T190738` specifies July 10, 2013 at 19:07:38.

The interval parameter can be used to clamp this parameter to every N seconds, instead of every second.

date_format = '%Y-%m-%dT%H%M%S'

class luigi.**DateIntervalParameter**(*default=<object object>*, *is_global=False*, *significant=True*, *description=None*, *config_path=None*, *positional=True*, *always_in_help=False*, *batch_method=None*, *visibility=<ParameterVisibility.PUBLIC: 0>*)
Bases: *luigi.parameter.Parameter*

A Parameter whose value is a *DateInterval*.

Date Intervals are specified using the ISO 8601 date notation for dates (eg. “2015-11-04”), months (eg. “2015-05”), years (eg. “2015”), or weeks (eg. “2015-W35”). In addition, it also supports arbitrary date intervals provided as two dates separated with a dash (eg. “2015-11-04-2015-12-04”).

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It’s true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*

- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

parse (*s*)

Parses a *DateInterval* from the input.

see *luigi.date_interval* for details on the parsing of DateIntervals.

class luigi.**TimeDeltaParameter** (*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *luigi.parameter.Parameter*

Class that maps to timedelta using strings in any of the following forms:

- **n {w[eek[s]]|d[ay[s]]|h[our[s]]|m[inute[s]|s[second[s]]} (e.g. "1 week 2 days" or "1 h")**
  Note: multiple arguments must be supplied in longest to shortest unit order
- ISO 8601 duration `PnDTnHnMnS` (each field optional, years and months not supported)
- ISO 8601 duration `PnW`

See https://en.wikipedia.org/wiki/ISO_8601#Durations

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

parse (*input*)

Parses a time delta from the input.

See *TimeDeltaParameter* for details on supported formats.

serialize(*x*)

Converts datetime.timedelta to a string

Parameters **x** – the value to serialize.

class luigi.**IntParameter**(*default=<object object>*, *is_global=False*, *significant=True*, *description=None*, *config_path=None*, *positional=True*, *always_in_help=False*, *batch_method=None*, *visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *luigi.parameter.Parameter*

Parameter whose value is an `int`.

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

parse(*s*)

Parses an `int` from the string using `int()`.

next_in_enumeration(*value*)

If your Parameter type has an enumerable ordering of values. You can choose to override this method. This method is used by the *luigi.execution_summary* module for pretty printing purposes. Enabling it to pretty print tasks like `MyTask(num=1), MyTask(num=2), MyTask(num=3)` to `MyTask(num=1..3)`.

Parameters **value** – The value

Returns The next value, like "value + 1". Or `None` if there's no enumerable ordering.

class luigi.**FloatParameter**(*default=<object object>*, *is_global=False*, *significant=True*, *description=None*, *config_path=None*, *positional=True*, *always_in_help=False*, *batch_method=None*, *visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *luigi.parameter.Parameter*

Parameter whose value is a `float`.

Parameters

- **`default`** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **`significant`** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **`description`** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **`config_path`** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **`positional`** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **`always_in_help`** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **`batch_method`** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **`visibility`** – A Parameter whose value is a *`ParameterVisibility`*. Default value is ParameterVisibility.PUBLIC

`parse`(*s*)
Parses a `float` from the string using `float()`.

class luigi.**BoolParameter**(**args*, ***kwargs*)
Bases: *`luigi.parameter.Parameter`*

A Parameter whose value is a `bool`. This parameter has an implicit default value of `False`. For the command line interface this means that the value is `False` unless you add `"--the-bool-parameter"` to your command without giving a parameter value. This is considered *implicit* parsing (the default). However, in some situations one might want to give the explicit bool value (`"--the-bool-parameter true|false"`), e.g. when you configure the default value to be `True`. This is called *explicit* parsing. When omitting the parameter value, it is still considered `True` but to avoid ambiguities during argument parsing, make sure to always place bool parameters behind the task family on the command line when using explicit parsing.

You can toggle between the two parsing modes on a per-parameter base via

```
class MyTask(luigi.Task):
    implicit_bool = luigi.BoolParameter(parsing=luigi.BoolParameter.IMPLICIT_
↪PARSING)
    explicit_bool = luigi.BoolParameter(parsing=luigi.BoolParameter.EXPLICIT_
↪PARSING)
```

or globally by

```
luigi.BoolParameter.parsing = luigi.BoolParameter.EXPLICIT_PARSING
```

for all bool parameters instantiated after this line.

IMPLICIT_PARSING = 'implicit'

EXPLICIT_PARSING = 'explicit'

parsing = 'implicit'

parse (*val*)
Parses a `bool` from the string, matching 'true' or 'false' ignoring case.

normalize (*value*)
Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

class luigi.**TaskParameter** (*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)
Bases: *luigi.parameter.Parameter*

A parameter that takes another luigi task class.

When used programatically, the parameter should be specified directly with the *luigi.task.Task* (sub) class. Like `MyMetaTask(my_task_param=my_tasks.MyTask)`. On the command line, you specify the *luigi.task.Task.get_task_family()*. Like

```
$ luigi --module my_tasks MyMetaTask --my_task_param my_namespace.MyTask
```

Where `my_namespace.MyTask` is defined in the `my_tasks` python module.

When the *luigi.task.Task* class is instantiated to an object. The value will always be a task class (and not a string).

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.

- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a `ParameterVisibility`. Default value is ParameterVisibility.PUBLIC

parse (*input*)
Parse a task_famly using the `Register`

serialize (*cls*)
Converts the `luigi.task.Task` (sub) class to its family name.

class luigi.**ListParameter** (*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: `luigi.parameter.Parameter`

Parameter whose value is a `list`.

In the task definition, use

```
class MyTask(luigi.Task):
  grades = luigi.ListParameter()

    def run(self):
        sum = 0
        for element in self.grades:
            sum += element
        avg = sum / len(self.grades)
```

At the command line, use

```
$ luigi --module my_tasks MyTask --grades <JSON string>
```

Simple example with two grades:

```
$ luigi --module my_tasks MyTask --grades '[100,70]'
```

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.

- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

normalize(*x*)

Ensure that struct is recursively converted to a tuple so it can be hashed.

Parameters x (*str*) – the value to parse.

Returns the normalized (hashable/immutable) value.

parse(*x*)

Parse an individual value from the input.

Parameters x (*str*) – the value to parse.

Returns the parsed value.

serialize(*x*)

Opposite of *parse()*.

Converts the value `x` to a string.

Parameters x – the value to serialize.

class luigi.**TupleParameter**(*default=<object object>, is_global=False, significant=True, description=None, config_path=None, positional=True, always_in_help=False, batch_method=None, visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *luigi.parameter.ListParameter*

Parameter whose value is a `tuple` or `tuple` of tuples.

In the task definition, use

```
class MyTask(luigi.Task):
  book_locations = luigi.TupleParameter()

    def run(self):
        for location in self.book_locations:
            print("Go to page %d, line %d" % (location[0], location[1]))
```

At the command line, use

```
$ luigi --module my_tasks MyTask --book_locations <JSON string>
```

Simple example with two grades:

```
$ luigi --module my_tasks MyTask --book_locations '((12,3),(4,15),(52,1))'
```

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

parse(*x*)

Parse an individual value from the input.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

class luigi.**EnumParameter**(**args*, ***kwargs*)

Bases: *luigi.parameter.Parameter*

A parameter whose value is an `Enum`.

In the task definition, use

```
class Model(enum.Enum):
  Honda = 1
  Volvo = 2

class MyTask(luigi.Task):
  my_param = luigi.EnumParameter(enum=Model)
```

At the command line, use,

```
$ luigi --module my_tasks MyTask --my-param Honda
```

parse(*s*)

Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

serialize(*e*)
Opposite of *parse()*.

Converts the value `x` to a string.

Parameters **x** – the value to serialize.

class luigi.**DictParameter**(*default=<object object>*, *is_global=False*, *significant=True*, *description=None*, *config_path=None*, *positional=True*, *always_in_help=False*, *batch_method=None*, *visibility=<ParameterVisibility.PUBLIC: 0>*)
Bases: *luigi.parameter.Parameter*

Parameter whose value is a `dict`.

In the task definition, use

```
class MyTask(luigi.Task):
  tags = luigi.DictParameter()

    def run(self):
        logging.info("Find server with role: %s", self.tags['role'])
        server = aws.ec2.find_my_resource(self.tags)
```

At the command line, use

```
$ luigi --module my_tasks MyTask --tags <JSON string>
```

Simple example with two tags:

```
$ luigi --module my_tasks MyTask --tags '{"role": "web", "env": "staging"}'
```

It can be used to define dynamic parameters, when you do not know the exact list of your parameters (e.g. list of tags, that are dynamically constructed outside Luigi), or you have a complex parameter containing logically related values (like a database connection config).

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.
- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.

- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a `ParameterVisibility`. Default value is ParameterVisibility.PUBLIC

normalize(*value*)
Ensure that dictionary parameter is converted to a FrozenOrderedDict so it can be hashed.

parse(*source*)
Parses an immutable and ordered `dict` from a JSON string using standard JSON library.

We need to use an immutable dictionary, to create a hashable parameter and also preserve the internal structure of parsing. The traversal order of standard `dict` is undefined, which can result various string representations of this parameter, and therefore a different task id for the task containing this parameter. This is because task id contains the hash of parameters' JSON representation.

Parameters **s** – String to be parse

serialize(*x*)
Opposite of `parse()`.

Converts the value `x` to a string.

Parameters **x** – the value to serialize.

luigi.**run**(**args*, ***kwargs*)
Please dont use. Instead use *luigi* binary.

Run from cmdline using argparse.

Parameters **use_dynamic_argparse** – Deprecated and ignored

luigi.**build**(*tasks*, *worker_scheduler_factory=None*, *detailed_summary=False*, ***env_params*)
Run internally, bypassing the cmdline parsing.

Useful if you have some luigi code that you want to run internally. Example:

```
luigi.build([MyTask1(), MyTask2()], local_scheduler=True)
```

One notable difference is that *build* defaults to not using the identical process lock. Otherwise, *build* would only be callable once from each process.

Parameters

- **tasks** –
- **worker_scheduler_factory** –
- **env_params** –

Returns True if there were no scheduling errors, even if tasks may fail.

class luigi.**Event**
Bases: `object`

DEPENDENCY_DISCOVERED = 'event.core.dependency.discovered'

DEPENDENCY_MISSING = 'event.core.dependency.missing'

DEPENDENCY_PRESENT = 'event.core.dependency.present'

BROKEN_TASK = 'event.core.task.broken'

START = 'event.core.start'

PROGRESS = 'event.core.progress'

This event can be fired by the task itself while running. The purpose is for the task to report progress, metadata or any generic info so that event handler listening for this can keep track of the progress of running task.

FAILURE = 'event.core.failure'

SUCCESS = 'event.core.success'

PROCESSING_TIME = 'event.core.processing_time'

TIMEOUT = 'event.core.timeout'

PROCESS_FAILURE = 'event.core.process_failure'

class luigi.**NumericalParameter**(*left_op=<built-in function le>*, *right_op=<built-in function lt>*, **args*, ***kwargs*)

Bases: *luigi.parameter.Parameter*

Parameter whose value is a number of the specified type, e.g. `int` or `float` and in the range specified.

In the task definition, use

```
class MyTask(luigi.Task):
    my_param_1 = luigi.NumericalParameter(
        var_type=int, min_value=-3, max_value=7) # -3 <= my_param_1 < 7
    my_param_2 = luigi.NumericalParameter(
        var_type=int, min_value=-3, max_value=7, left_op=operator.lt, right_
↪op=operator.le) # -3 < my_param_2 <= 7
```

At the command line, use

```
$ luigi --module my_tasks MyTask --my-param-1 -3 --my-param-2 -2
```

Parameters

- **var_type** (*function*) – The type of the input variable, e.g. int or float.
- **min_value** – The minimum value permissible in the accepted values range. May be inclusive or exclusive based on left_op parameter. This should be the same type as var_type.
- **max_value** – The maximum value permissible in the accepted values range. May be inclusive or exclusive based on right_op parameter. This should be the same type as var_type.
- **left_op** (*function*) – The comparison operator for the left-most comparison in the expression `min_value left_op value right_op value`. This operator should generally be either `operator.lt` or `operator.le`. Default: `operator.le`.
- **right_op** (*function*) – The comparison operator for the right-most comparison in the expression `min_value left_op value right_op value`. This operator should generally be either `operator.lt` or `operator.le`. Default: `operator.lt`.

parse(*s*)

Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

class luigi.**ChoiceParameter**(*var_type=<type 'str'>*, **args*, ***kwargs*)

Bases: *luigi.parameter.Parameter*

A parameter which takes two values:

1. an instance of `Iterable` and
2. the class of the variables to convert to.

In the task definition, use

```
class MyTask(luigi.Task):
    my_param = luigi.ChoiceParameter(choices=[0.1, 0.2, 0.3], var_type=float)
```

At the command line, use

```
$ luigi --module my_tasks MyTask --my-param 0.1
```

Consider using *EnumParameter* for a typed, structured alternative. This class can perform the same role when all choices are the same type and transparency of parameter value on the command line is desired.

Parameters

- **var_type** (*function*) – The type of the input variable, e.g. str, int, float, etc. Default: str
- **choices** – An iterable, all of whose elements are of *var_type* to restrict parameter choices to.

parse(*s*)

Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters **x** (*str*) – the value to parse.

Returns the parsed value.

normalize(*var*)

Given a parsed parameter value, normalizes it.

The value can either be the result of parse(), the default value or arguments passed into the task's constructor by instantiation.

This is very implementation defined, but can be used to validate/clamp valid values. For example, if you wanted to only accept even integers, and "correct" odd values to the nearest integer, you can implement normalize as `x // 2 * 2`.

class luigi.**OptionalParameter**(*default=<object object>*, *is_global=False*, *significant=True*, *description=None*, *config_path=None*, *positional=True*, *always_in_help=False*, *batch_method=None*, *visibility=<ParameterVisibility.PUBLIC: 0>*)

Bases: *luigi.parameter.Parameter*

A Parameter that treats empty string as None

Parameters

- **default** – the default value for this parameter. This should match the type of the Parameter, i.e. `datetime.date` for `DateParameter` or `int` for `IntParameter`. By default, no default is stored and the value must be specified at runtime.

- **significant** (*bool*) – specify `False` if the parameter should not be treated as part of the unique identifier for a Task. An insignificant Parameter might also be used to specify a password or other sensitive information that should not be made public via the scheduler. Default: `True`.
- **description** (*str*) – A human-readable string describing the purpose of this Parameter. For command-line invocations, this will be used as the *help* string shown to users. Default: `None`.
- **config_path** (*dict*) – a dictionary with entries `section` and `name` specifying a config file entry from which to read the default value for this parameter. DEPRECATED. Default: `None`.
- **positional** (*bool*) – If true, you can set the argument as a positional argument. It's true by default but we recommend `positional=False` for abstract base classes and similar cases.
- **always_in_help** (*bool*) – For the –help option in the command line parsing. Set true to always show in –help.
- **batch_method** (*function(iterable[A])->A*) – Method to combine an iterable of parsed parameter values into a single value. Used when receiving batched parameter lists from the scheduler. See *Batching multiple parameter values into a single run*
- **visibility** – A Parameter whose value is a *ParameterVisibility*. Default value is ParameterVisibility.PUBLIC

serialize(*x*)

Opposite of `parse()`.

Converts the value `x` to a string.

Parameters x – the value to serialize.

parse(*x*)

Parse an individual value from the input.

The default implementation is the identity function, but subclasses should override this method for specialized parsing.

Parameters x (*str*) – the value to parse.

Returns the parsed value.

class luigi.**LuigiStatusCode**

Bases: `enum.Enum`

All possible status codes for the attribute `status` in *LuigiRunResult* when the argument `detailed_summary=True` in *luigi.run() / luigi.build*. Here are the codes and what they mean:

Status Code Name	Meaning
SUCCESS	There were no failed tasks or missing dependencies
SUCCESS_WITH_RETRY	There were failed tasks but they all succeeded in a retry
FAILED	There were failed tasks
FAILED_AND_SCHEDULING_FAILED	There were failed tasks and tasks whose scheduling failed
SCHEDULING_FAILED	There were tasks whose scheduling failed
NOT_RUN	There were tasks that were not granted run permission by the scheduler
MISSING_EXT	There were missing external dependencies

SUCCESS = (':)', 'there were no failed tasks or missing dependencies')

```
SUCCESS_WITH_RETRY = (':)',  'there were failed tasks but they all succeeded in a retr
FAILED = (':(', 'there were failed tasks')
FAILED_AND_SCHEDULING_FAILED = (':(', 'there were failed tasks and tasks whose schedul
SCHEDULING_FAILED = (':(', 'there were tasks whose scheduling failed')
NOT_RUN = (':|', 'there were tasks that were not granted run permission by the schedul
MISSING_EXT = (':|', 'there were missing external dependencies')
```

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Python Module Index

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