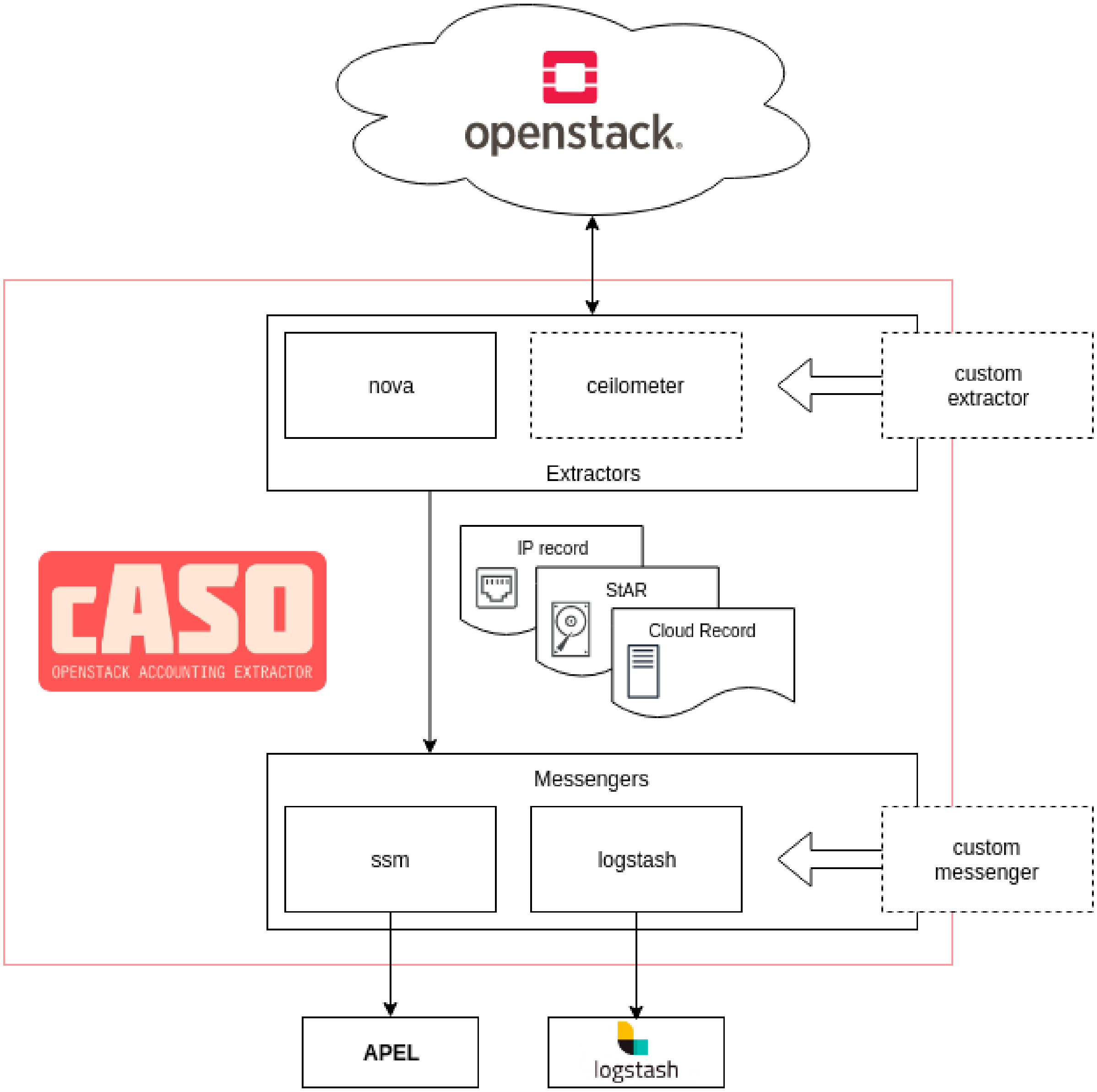
caso Documentation

Spanish National Research Council (CSIC)

Mar 31, 2023

CONTENTS

cASO is an accounting reporter (currently supports Cloud Accounting Usage Records) for OpenStack deployments. cASO gets usage information from OpenStack public APIs (no access to DB is required) and can generate valid output for Apel SSM or logstash.



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CHAPTER

ONE

CASO RELEASE NOTES

1.1 Current Release Notes

1.1.1 3.0.0-52

New Features

- Allow to load more than one extractor in the configuration, making possible to get more than one type of record.
- Add support for the EMI STaR records for storage, and support extracting records from OpenStack Cinder.

1.1.2 3.0.0

New Features

- Add support for GPU accounting, using the GPU 0.1 record agreed with APEL.

Upgrade Notes

- Please ensure that you have the correct configuration in the policy files, as a new policy rule must be modified. The accounting user does not need to have access to the "identity:list_users" action, but to the "identity:get_user" action instead.

Deprecation Notes

- All the *benchmark_** and *accelerator_* option definitions in the *[DEFAULT]* section of the configuration file have been marked as deprecated, and are now included in the individual *[benchmark]* and *[acelerator]* sections, with the corresponding prefix (i.e. *benchmark_* and *accelerator_*) removed. Check the sample configuration file for more details.

Bug Fixes

- Fix an issue when getting the usernames, that caused configuration errors to be unnoticed.

Other Notes

- Keystone versions from Ussuri onwards (>= 17.0.0) implement a new policy. Please check the documentation so as to ensure that you are applying the correct changes.

1.1.3 2.1.0

Prelude

This version includes a refactoring of the base extractors, dropping support for the ceilometer extractor that was unmaintained for a long period of time.

Upgrade Notes

- Ceilometer extractor is no longer supported.

1.1.4 2.0.0

Prelude

Starting with this version cASO release notes are published within the documentation. This version is a major release that implements IP accounting record, as well as several bugfixes. There are no upgrade notes to take into account.

New Features

- Add multi-region support in order to extract information from several regions through different configuration files.
- New IP accounting record is implemented. Now cASO is able to extract IP accounting and publish it using its JSON rendering. No new configuration needs to be done, but the cASO user needs to have access to the Neutron endpoints.
- cASO now allows to specity the projects to extract records from as project IDs, rather than names. When dealing with different identity domains this is troublesome, therefore we need to allow users to specify project IDs rather than names.

Bug Fixes

- Define the correct entrypoints for the V2 and V4 messengers.
- Generate LOG warnings when mappings cannot be found.

CHAPTER

TWO

INSTALLATION

2.1 Pre-requisites

If you are planning to use cASO for generating accounting records for EGI, you will need a valid APEL/SSM configuration. Follow the documentation available at the EGI.eu Federated Cloud documentation in order to set it up.

2.2 Installation

The best way to install cASO and have the most up to date version is using the repositories and packages provided in the EGI AppDB:

> https://appdb.egi.eu/store/software/caso

2.2.1 Manual installation

Even the reccomended method is to use a package from the EGI AppDB, it is possible to install it from the Python Pacakge Index as follows:

```
$ pip install caso
```

Or you can install it on a virtualenv:

```
$ virtualenv --python python3 caso
$ source caso/bin/activate
(caso) $ pip install caso
```

CHAPTER

THREE

CONFIGURATION

3.1 OpenStack Configuration

Apart from configuring cASO, several actions need to be performed in your OpenStack installation in order to be able to extract accounting records.

3.1.1 User credentials (required)

In the next section you will configure an OpenStack Keystone credentials in order to extract the records. The cASO user has to be a member of each of the projects (another option is to convert that user in an administrator, but the former option is a safer approach) for which it is extracting the accounting. Otherwise, `cASO` will not be able to get the usages and will fail.

In order to do so, we are going to setup a new role `accounting` a new user `accounting`, adding it to each of the projects with that role:

```
openstack role create accounting
openstack user create --password <password> accounting
# For each of the projects, add the user with the accounting role
openstack role add --user accounting --project <project> accounting
```

3.1.2 Policy modifications

The accounting user needs access to Keystone so as to extract the users information. In this case, we can can grant the user just the rights for listing the users adding the appropriate rules in your policy configuration. Depending on your configuration, you need to modify the JSON policy file (`/etc/keystone/policy.json`) or the YAML policy file (`/etc/keystone/policy-yaml`). The modifications in the policy depend on the Keystone version, please ensure that you are applying the correct changes as listed in the following table.

OpenStack Version	Policy contents	
From Stein (>= 15.0.0)	Original	`“identity:get_user”: “(role:reader and system_scope:all) or (role:reader and token.domain.id:%(target.user.domain_id)s) or user_id:%(target.user.id)s”`
	Modified	`“identity:get_user”: “(role:reader and system_scope:all) or (role:reader and token.domain.id:%(target.user.domain_id)s) or user_id:%(target.user.id)s or role:accounting”`
Up to Rocky (<= 14.0.0)	Original	`“identity:get_user”: “rule:admin_or_owner”`
	Modified	`“identity:get_user”: “rule:admin_or_owner or role:accounting”`

3.2 cASO configuration

`cASO` uses a config file (default at `/etc/caso/caso.conf`) with several sections. A sample file is available at `etc/caso/caso.conf.sample`.

3.2.1 `[DEFAULT]` section

The `[DEFAULT]` section configures the basic behavior of `cASO`. The sample config file (`/etc/caso/caso.conf.sample`) includes a description of every option. You should check at least the following options:

- `extractor` (default value: `nova`), specifies which extractor to use for getting the data. The following APIs are supported: `ceilomenter` and `nova`. Both should generate equivalent information.
- `site_name` (default value: `<None>`). Name of the site as defined in GOCDB.
- `service_name` (default value: `$site_name`). Name of the service within a site. This is used if you have several endpoints within your site.
- `projects` (list value, default empty). List of the projects to extract records from. You can use either the project ID or the project name. We recommend that you use the project ID, especially if you are using domain-based authentication, as otherwise gathering the information might fail.
- `messengers` (list, default: `noop`). List of the messengers to publish data to. Records will be pushed to all these messengers, in order. Valid messengers shipped with cASO are:
  - `ssm` for publishing APEL V0.2 records (deprecated).
  - `ssmv2` for publishing APEL V0.2 records (deprecated).
  - `ssmv4` for publishing APEL V0.3 records (current).

  - logstash for publishing to Logstash.
  - noop do nothing at all.

  Note that there might be other messengers available in the system if they are registered into the caso.messenger entry point namespace.

- mapping_file (default: /etc/caso/voms.json). File containing the mapping from VOs to local projects as configured in Keystone-VOMS, in the following form:

```
{
    "VO": {
        "projects": ["foo", "bar"],
    }
}
```

  Note that you have to use either the project ID or project name for the mapping, as configured in the projects configuration variable.

- benchmark_name_key and benchmark_value_key. These two configuration options are used by cASO to retrieve the benchmark information form the OpenStack flavors.

3.2.2 [keystone_auth] section

This section is used to specify the authentication credentials to be used to connect to the OpenStack APIs. cASO leverages the OpenStack keystoneauth library for authentication, so that it is possible to use any authentication plugin that is available there (so starting on version 1.0 of cASO it is possible to use the Keystone V3 API).

Important: You need to specify the auth_type that you want to use (normally v3password is a good choice.

For an exhaustive list of available plugins please refer to the keystoneauth documentation.

3.2.3 [ssm] section

Options defined here configure the SSM messenger. There is only one option at the moment:

- output_path (default: /var/spool/apel/outgoing/openstack), directory to put the generated SSM records. APEL/SSM should be configured to take records from that directory.

3.2.4 [logstash] section

Options defined here configure the logstash messenger. Available options:

- host (default: localhost), host of Logstash server.
- port (default: 5000), Logstash server port.

3.2.5 Other cASO configuration options

For an exhaustive list of the defined options, please check the following page:

cASO configuration file

caso: DEFAULT

`messengers`

Type
list

Default
`['noop']`

List of messengers that will dispatch records. valid values are logstash,noop,ssm,ssmv4. You can specify more than one messenger.

`spooldir`

Type
string

Default
`/var/spool/caso`

Spool directory.

`lock_path`

Type
string

Default
`$spooldir`

Directory to use for lock files. For security, the specified directory should only be writable by the user running the processes that need locking. Defaults to environment variable CASO_LOCK_PATH or $spooldir

`dry_run`

Type
boolean

Default
`False`

Extract records but do not push records to SSM. This will not update the last run date.

Table 1: Deprecated Variations

Group	Name
DEFAULT	dry_run

`site_name`

Type
string

Default
`<None>`

Site name as in GOCDB.

`service_name`

Type
string

Default
`$site_name`

Service name within the site

`projects`

Type
list

Default
`[]`

List of projects to extract accounting records from.

Table 2: Deprecated Variations

Group	Name
DEFAULT	tenants

`mapping_file`

Type
string

Default
`/etc/caso/voms.json`

File containing the VO <-> project mapping as used in Keystone-VOMS.

Table 3: Deprecated Variations

Group	Name
extractor	mapping_file

`extract_to`

Type
string

Default
`<None>`

Extract record changes until this date. If it is not set, we use now. If a server has ended after this date, it will be included, but the consuption reported will end on this date. If no time zone is specified, UTC will be used.

Table 4: Deprecated Variations

Group	Name
DEFAULT	extract_to

`extract_from`

Type
string

Default
`<None>`

Extract records that have changed after this date. This means that if a record has started before this date, and it has changed after this date (i.e. it is still running or it has ended) it will be reported. If it is not set, extract records from last run. If it is set to None and last run file is not present, it will extract records from the beginning of time. If no time zone is specified, UTC will be used.

Table 5: Deprecated Variations

Group	Name
DEFAULT	extract_from

`extractor`

Type
list

Default
`['nova']`

Which extractor to use for getting the data. If you do not specify anything, nova will be used. Available choices are frozenset({'cinder', 'neutron', 'nova'})

caso: accelerator

`type_key`

Type
string

Default
`Accelerator:Type`

Metadata key used to retrieve the accelerator type from the flavor properties.

Table 6: Deprecated Variations

Group	Name
DEFAULT	accelerator_type_key

`vendor_key`

Type
string

Default
`Accelerator:Vendor`

Metadata key used to retrieve the accelerator vendor from the flavor properties.

Table 7: Deprecated Variations

Group	Name
DEFAULT	accelerator_vendor_key

model_key

Type
string

Default
`Accelerator:Model`

Metadata key used to retrieve the accelerator model from the flavor properties.

Table 8: Deprecated Variations

Group	Name
DEFAULT	accelerator_model_key

number_key

Type
string

Default
`Accelerator:Number`

Metadata key used to retrieve the accelerator number from the flavor properties.

Table 9: Deprecated Variations

Group	Name
DEFAULT	accelerator_number_key

caso: benchmark

name_key

Type
string

Default
`accounting:benchmark_type`

Metadata key used to retrieve the benchmark type from the flavor properties.

Table 10: Deprecated Variations

Group	Name
DEFAULT	benchmark_name_key

value_key

Type
string

Default
`accounting:benchmark_value`

Metadata key used to retrieve the benchmark value from the flavor properties.

Table 11: Deprecated Variations

Group	Name
DEFAULT	benchmark_value_key

caso: keystone_auth

`auth_type`

Type
unknown type

Default
`<None>`

Authentication type to load

Table 12: Deprecated Variations

Group	Name
keystone_auth	auth_plugin

`auth_section`

Type
unknown type

Default
`<None>`

Config Section from which to load plugin specific options

`cafile`

Type
string

Default
`<None>`

PEM encoded Certificate Authority to use when verifying HTTPs connections.

`certfile`

Type
string

Default
`<None>`

PEM encoded client certificate cert file

`keyfile`

Type
string

Default
`<None>`

PEM encoded client certificate key file

`insecure`

Type
boolean

Default
`False`

Verify HTTPS connections.

`timeout`

Type
integer

Default
`<None>`

Timeout value for http requests

`collect_timing`

Type
boolean

Default
`False`

Collect per-API call timing information.

`split_loggers`

Type
boolean

Default
`False`

Log requests to multiple loggers.

`auth_url`

Type
unknown type

Default
`<None>`

Authentication URL

`system_scope`

Type
unknown type

Default
`<None>`

Scope for system operations

`domain_id`

Type
unknown type

Default
<None>

Domain ID to scope to

`domain_name`

Type
unknown type

Default
<None>

Domain name to scope to

`project_id`

Type
unknown type

Default
<None>

Project ID to scope to

Table 13: Deprecated Variations

Group	Name
keystone_auth	tenant-id
keystone_auth	tenant_id

`project_name`

Type
unknown type

Default
<None>

Project name to scope to

Table 14: Deprecated Variations

Group	Name
keystone_auth	tenant-name
keystone_auth	tenant_name

`project_domain_id`

Type
unknown type

Default
<None>

Domain ID containing project

`project_domain_name`

Type
unknown type

Default
<None>

Domain name containing project

`trust_id`

Type
unknown type

Default
<None>

ID of the trust to use as a trustee use

`default_domain_id`

Type
unknown type

Default
<None>

Optional domain ID to use with v3 and v2 parameters. It will be used for both the user and project domain in v3 and ignored in v2 authentication.

`default_domain_name`

Type
unknown type

Default
<None>

Optional domain name to use with v3 API and v2 parameters. It will be used for both the user and project domain in v3 and ignored in v2 authentication.

`user_id`

Type
unknown type

Default
<None>

User id

`username`

Type
unknown type

Default
<None>

Username

Table 15: Deprecated Variations

Group	Name
keystone_auth	user-name
keystone_auth	user_name

`user_domain_id`

Type
unknown type

Default
`<None>`

User's domain id

`user_domain_name`

Type
unknown type

Default
`<None>`

User's domain name

`password`

Type
unknown type

Default
`<None>`

User's password

caso: logstash

`host`

Type
string

Default
`localhost`

Logstash host to send records to.

`port`

Type
integer

Default
`5000`

Logstash server port.

caso: ssm

`output_path`

Type
string

Default
`/var/spool/apel/outgoing/openstack`

Directory to put the generated SSM records.

`max_size`

Type
integer

Default
`100`

Maximum number of records to send per message

oslo.config: DEFAULT

`config_file`

Type
list of filenames

Default
`['~/.project/project.conf', '~/project.conf', '/etc/project/project.conf', '/etc/project.conf']`

Path to a config file to use. Multiple config files can be specified, with values in later files taking precedence. Defaults to the value above. This option must be set from the command-line.

`config_dir`

Type
list of directory names

Default
`['~/.project/project.conf.d/', '~/project.conf.d/', '/etc/project/project.conf.d/', '/etc/project.conf.d/']`

Path to a config directory to pull **.conf* files from. This file set is sorted, so as to provide a predictable parse order if individual options are over-ridden. The set is parsed after the file(s) specified via previous –config-file, arguments hence over-ridden options in the directory take precedence. This option must be set from the command-line.

`config_source`

Type
list

Default
`[]`

Lists configuration groups that provide more details for accessing configuration settings from locations other than local files.

`driver`

Type
string

Default
`remote_file`

This option has a sample default set, which means that its actual default value may vary from the one documented above.

The name of the driver that can load this configuration source.

`uri`

Type
URI

Default
`https://example.com/my-configuration.ini`

This option has a sample default set, which means that its actual default value may vary from the one documented above.

Required option with the URI of the extra configuration file's location.

`ca_path`

Type
string

Default
`/etc/ca-certificates`

This option has a sample default set, which means that its actual default value may vary from the one documented above.

The path to a CA_BUNDLE file or directory with certificates of trusted CAs.

`client_cert`

Type
string

Default
`/etc/ca-certificates/service-client-keystore`

This option has a sample default set, which means that its actual default value may vary from the one documented above.

Client side certificate, as a single file path containing either the certificate only or the private key and the certificate.

`client_key`

Type
string

Default
`<None>`

Client side private key, in case client_cert is specified but does not includes the private key.

oslo.log: DEFAULT

`debug`

Type
boolean

Default
`False`

Mutable
This option can be changed without restarting.

If set to true, the logging level will be set to DEBUG instead of the default INFO level.

`log_config_append`

Type
string

Default
`<None>`

Mutable
This option can be changed without restarting.

The name of a logging configuration file. This file is appended to any existing logging configuration files. For details about logging configuration files, see the Python logging module documentation. Note that when logging configuration files are used then all logging configuration is set in the configuration file and other logging configuration options are ignored (for example, log-date-format).

Table 16: Deprecated Variations

Group	Name
DEFAULT	log-config
DEFAULT	log_config

`log_date_format`

Type
string

Default
`%Y-%m-%d %H:%M:%S`

Defines the format string for %(asctime)s in log records. Default: the value above . This option is ignored if log_config_append is set.

`log_file`

Type
string

Default
`<None>`

(Optional) Name of log file to send logging output to. If no default is set, logging will go to stderr as defined by use_stderr. This option is ignored if log_config_append is set.

Table 17: Deprecated Variations

Group	Name
DEFAULT	logfile

`log_dir`

Type
string

Default
`<None>`

(Optional) The base directory used for relative log_file paths. This option is ignored if log_config_append is set.

Table 18: Deprecated Variations

Group	Name
DEFAULT	logdir

`watch_log_file`

Type
boolean

Default
`False`

Uses logging handler designed to watch file system. When log file is moved or removed this handler will open a new log file with specified path instantaneously. It makes sense only if log_file option is specified and Linux platform is used. This option is ignored if log_config_append is set.

`use_syslog`

Type
boolean

Default
`False`

Use syslog for logging. Existing syslog format is DEPRECATED and will be changed later to honor RFC5424. This option is ignored if log_config_append is set.

`use_journal`

Type
boolean

Default
`False`

Enable journald for logging. If running in a systemd environment you may wish to enable journal support. Doing so will use the journal native protocol which includes structured metadata in addition to log messages.This option is ignored if log_config_append is set.

`syslog_log_facility`

Type
string

Default
`LOG_USER`

Syslog facility to receive log lines. This option is ignored if log_config_append is set.

`use_json`

Type
boolean

Default
`False`

Use JSON formatting for logging. This option is ignored if log_config_append is set.

`use_stderr`

Type
boolean

Default
`False`

Log output to standard error. This option is ignored if log_config_append is set.

`use_eventlog`

Type
boolean

Default
`False`

Log output to Windows Event Log.

`log_rotate_interval`

Type
integer

Default
`1`

The amount of time before the log files are rotated. This option is ignored unless log_rotation_type is set to "interval".

`log_rotate_interval_type`

Type
string

Default
`days`

Valid Values
Seconds, Minutes, Hours, Days, Weekday, Midnight

Rotation interval type. The time of the last file change (or the time when the service was started) is used when scheduling the next rotation.

`max_logfile_count`

Type
integer

Default
`30`

Maximum number of rotated log files.

`max_logfile_size_mb`

Type
integer

Default
`200`

Log file maximum size in MB. This option is ignored if "log_rotation_type" is not set to "size".

`log_rotation_type`

Type
string

Default
`none`

Valid Values
interval, size, none

Log rotation type.

Possible values

interval
Rotate logs at predefined time intervals.

size
Rotate logs once they reach a predefined size.

none
Do not rotate log files.

`logging_context_format_string`

Type
string

Default

```
%(asctime)s.%(msecs)03d %(process)d %(levelname)s %(name)s
[%(global_request_id)s %(request_id)s %(user_identity)s]
%(instance)s%(message)s
```

Format string to use for log messages with context. Used by oslo_log.formatters.ContextFormatter

`logging_default_format_string`

Type
string

Default

```
%(asctime)s.%(msecs)03d %(process)d %(levelname)s %(name)s [-]
%(instance)s%(message)s
```

Format string to use for log messages when context is undefined. Used by oslo_log.formatters.ContextFormatter `logging_debug_format_suffix`

Type
string

Default
`%(funcName)s %(pathname)s:%(lineno)d`

Additional data to append to log message when logging level for the message is DEBUG. Used by oslo_log.formatters.ContextFormatter

`logging_exception_prefix`

Type
string

Default
`%(asctime)s.%(msecs)03d %(process)d ERROR %(name)s %(instance)s`

Prefix each line of exception output with this format. Used by oslo_log.formatters.ContextFormatter

`logging_user_identity_format`

Type
string

Default
`%(user)s %(project)s %(domain)s %(system_scope)s %(user_domain)s %(project_domain)s`

Defines the format string for %(user_identity)s that is used in logging_context_format_string. Used by oslo_log.formatters.ContextFormatter

`default_log_levels`

Type
list

Default
```
['amqp=WARN', 'amqplib=WARN', 'boto=WARN', 'qpid=WARN',
'sqlalchemy=WARN', 'suds=INFO', 'oslo.messaging=INFO',
'oslo_messaging=INFO', 'iso8601=WARN', 'requests.packages.urllib3.
connectionpool=WARN', 'urllib3.connectionpool=WARN', 'websocket=WARN',
'requests.packages.urllib3.util.retry=WARN', 'urllib3.util.
retry=WARN', 'keystonemiddleware=WARN', 'routes.middleware=WARN',
'stevedore=WARN', 'taskflow=WARN', 'keystoneauth=WARN', 'oslo.
cache=INFO', 'oslo_policy=INFO', 'dogpile.core.dogpile=INFO']
```

List of package logging levels in logger=LEVEL pairs. This option is ignored if log_config_append is set.

`publish_errors`

Type
boolean

Default
`False`

Enables or disables publication of error events.

`instance_format`

Type
string

Default
`"[instance: %(uuid)s] "`

The format for an instance that is passed with the log message.

`instance_uuid_format`

Type
string

Default
`"[instance: %(uuid)s] "`

The format for an instance UUID that is passed with the log message.

`rate_limit_interval`

Type
integer

Default
`0`

Interval, number of seconds, of log rate limiting.

`rate_limit_burst`

Type
integer

Default
`0`

Maximum number of logged messages per rate_limit_interval.

`rate_limit_except_level`

Type
string

Default
`CRITICAL`

Log level name used by rate limiting: CRITICAL, ERROR, INFO, WARNING, DEBUG or empty string. Logs with level greater or equal to rate_limit_except_level are not filtered. An empty string means that all levels are filtered.

`fatal_deprecations`

Type
boolean

Default
`False`

Enables or disables fatal status of deprecations.

3.3 Additional (optional) configurations

3.3.1 Publishing benchmark information for OpenStack flavors (optional)

cASO is able to publish benchmark information included in the accounting recors, in order to do CPU normalization at the accounting level.

In order to do so, you need to add this information to the flavor properties and configure caso to retrieve this information. There are two different values that need to be added to the flavor

Table 19: Default flavor properties used by cASO to publish benchmark information

Property	Value
`accounting:benchmark_name`	Benchmark name (e.g. HEPSPEC06)
`accounting:benchmark_value`	Benchmark value (e.g. 99)

For example, if you are using HEPSPEC06 and the benchmark value is 99 for the flavor `m1.foo`, the benchmark information is configured as follows:

```
openstack flavor set --property accounting:benchmark_name="HEPSPEC06" --property␣
↪accounting:benchmark_value=99 m1.foo
```

Using different keys to specify bechmark information

If you do not want to use cASO's default flavor properties `accounting:benchmark_name` and `accounting:benchmark_value` (for example because you are using different benchmark types and values) you can specify which properties `cASO` should look for by using the `name_key` and `value_key` in the `[benchkmark]` section of the configuration file.

Important: Please note that there is an OpenStack scheduler filter that removes hosts based on flavor properties. In order to not interfere with the behaviour of this filter you must prefix the property with a `scope:` so that cASO's properties are not taken into account for this filtering. When adding these properties in cASO's configuration file, please include the complete name (i.e. `scope:property`).

Important: Option deprecation

Please bear in mind that the old options `benchmark_name_key` and `benchmark_value_key` in the `[DEFAULT]` configuration option are marked as deprecated. Please update your configuration file as soon as possible to avoid warnings.

3.3.2 Publishing accelerator information for OpenStack accelerators (optional)

Starting with cASO >= 3.0.0 it is possible to publish accelerator information using a new accounting record.

In order to do so, you need to add this information to the flavor properties and configure caso to retrieve this information. There are different values that need to be added to the flavor:

Table 20: Default flavor properties used by cASO to publish accelerator information

Flavor Property	Value
Accelerator:Type	The accelerator type (e.g. GPU))
Accelerator:Vendor	Name of the accelerator vendor (e.g. NVIDIA)
Accelerator:Model	Accelerator model (e.g. V100)
Accelerator:Number	Hoy many accelerators are available for that flavor (e.g. 2)

Using different keys to specify bechmark information

If you do not want to use cASO's default flavor properties to publish the existing accelerators, you can specify which properties `cASO` should look for by using the `type_key`, `vendor_key`, `model_key` and `number_key` in the `[acelerator]` section of the configuration file.

Important: Please note that there is an OpenStack scheduler filter that removes hosts based on flavor properties. In order to not interfere with the behaviour of this filter you must prefix the property with a `scope:` so that cASO's properties are not taken into account for this filtering. When adding these properties in cASO's configuration file, please include the complete name (i.e. `scope:property`).

CHAPTER FOUR

CASO MULTI-REGION SUPPORT

- In case the monitored projects rely on a specific region, define the following variable in the /etc/caso/caso.conf

```
[DEFAULT]
region_name = <REGION>
```

- In case the monitored Project(s) rely on different regions, prepare different files /etc/caso/caso-<REGION>.conf

```
[DEFAULT]
region_name = <REGION>
```

- List the Project(s) in the /etc/caso/voms.json as from the documentation

```
{
  "Project1": {
    "projects": ["Project1"]
  },
  "Project2": {
    "projects": ["Project2"]
  }
}
```

- Execute caso-extract for each Project (and related REGION) to be monitored (Project1-REGION1, Project2-REGION2)

```
/usr/bin/caso-extract --projects "Project1" --config-file /etc/caso/caso-<REGION1>.conf
/usr/bin/caso-extract --projects "Project2" --config-file /etc/caso/caso-<REGION2>.conf
```

CHAPTER

FIVE

USAGE

5.1 command line

cASO provides the caso-extract command to generate new records from your OpenStack deployment. caso-extract -h will show a complete list of available arguments.

Use the --extract-from argument to specify the date from when the records should be extracted. If no value is set, then cASO will extract the records from the last run. If equal to "None", then extract records from the beggining of time. If not time zone is specified, UTC will be used.

Important: If you are running an OpenStack Nova version lower than Kilo there is a bug in its API, making impossible to paginate over deleted results.

Since nova is limiting the results to 1000 by default, if you are expecting more than 1000 results you will get just the last 1000. This is important if you are publishing data for the first time, or if you are republishing all your accounting). If this is your case, adjust the osapi_max_limit to a larger value in /etc/nova/nova.conf.

5.1.1 Available options

Apart from other options, the following ones are the ones that specify how to extract accountig records:

--config-dir DIR

Path to a config directory to pull **.conf* files from. This file set is sorted, so as to provide a predictable parse order if individual options are over-ridden. The set is parsed after the file(s) specified via previous –config-file, arguments hence over-ridden options in the directory take precedence. This option must be set from the command-line.

--config-file PATH

Path to a config file to use. Multiple config files can be specified, with values in later files taking precedence. Defaults to None. This option must be set from the command-line.

--debug, -d

If set to true, the logging level will be set to DEBUG
instead of the default INFO level.

--dry-run, --dry_run

Extract records but do not push records to SSM. This will not update the last run date.

--extract-from `EXTRACT_FROM`, **--extract_from** `EXTRACT_FROM`

Extract records that have changed after this date. This means that if a record has started before this date, and it has changed after this date (i.e. it is still running or it has ended) it will be reported. If it is not set, extract records from last run. If it is set to None and last run file is not present, it will extract records from the beginning of time. If no time zone is specified, UTC will be used.

--extract-to `EXTRACT_TO`, **--extract_to** `EXTRACT_TO`

Extract record changes until this date. If it is not set, we use now. If a server has ended after this date, it will be included, but the consuption reported will end on this date. If no time zone is specified, UTC will be used.

--extractor `EXTRACTOR`

Which extractor to use for getting the data. If you do not specify anything, nova will be used. Allowed values: nova

--projects `PROJECTS`, **--tenants** `PROJECTS`

List of projects to extract accounting records from.

5.2 Running as a cron job

The best way of running `cASO` is via a cron job like the following:

```
10 * * * * caso-extract
```

CHAPTER

SIX

TROUBLESHOOTING

6.1 Cannot-find-VM-in-API

Danger: There is not a single recipe to fix this issue, and this involves touching and modifying the DB directly. We reccomend that you ignore these messages, unless you know what you are doing.

In the logs you can see the following warnings (caso version < 1.4.4):

```
WARNING caso.extract.nova [-] Cannot get server '072e77c0-4295-4a83-9bdf-6afde796a00d'␣
↪from the Nova API, probably because it is an old VM that whose metadata is wrong in␣
↪the DB. There will be no record generated for this VM. : NotFound: Instance 072e77c0-
↪4295-4a83-9bdf-6afde796a00d could not be found. (HTTP 404) (Request-ID: req-8eabf5d8-
↪b722-4ee4-b211-aec36fc0499e)
```

Or the following one (caso version >= 1.4.4):

```
WARNING caso.extract.nova [-] Cannot get server '072e77c0-4295-4a83-9bdf-6afde796a00d'␣
↪from the Nova API, probably because it is an error in the DB. Please refer to the␣
↪following page for more details: https://caso.readthedocs.io/en/stable/troubleshooting.
↪html#Cannot-find-VM-in-API
```

These errors are caused by a VM that is in a bad state on the DB. The `os-simple-tenant-usage` API is returning instances that cannot be obtained from the API.

This may be caused by any of the following cases:

1. VMs that have changed their status on a date that enters into the extrating period.
2. VMs that are terminated and deleted, but their status is incorrect (i.e. no value for `terminated_at`). This can be fixed by setting a `terminated_at` value that is correct, directly in the DB.

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